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ABSTRACT

The sign language of the American deaf community (ASL) is analyzed from a linguistic point of view. The history of the application of linguistic principles to sign language studies is briefly traced. The cherology (phonology) of sign language is treated with respect to finger spelling, manual numeration, ASL phonetics, and conventions of sign notation. The last subject deals with the three aspects of a sign that indicate where on the body it takes place (tabula, or tab), handshape and attitude (designator, or dez), and the action of the sign (signation, or sig). A section on morphocheremics deals with stylistic differences, double dez relationships, possible causes for sign change, compound signs, classes of color terms, and signs with initial letter dez. Finally, a section on morphology is devoted to questions and answers in ASL, the headshake as a signed negative, ASL syntax, and bilingualism and diglossia in deaf communities. A table of symbols used for writing signs is included. (JB)

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Sign Language Structure

William C. Stokoe

PZ DI940

The First Linguistic Analysis of AMERICAN SIGN LANGUAGE Newly Revised

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Linstok Press, Incorporated
9306 Mintwood Street
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Revised edition

PREFACE TO THE REVISED EDITION

Originally written to bring the language used by several hundred thousand Americans to the attention of language scientists, who had ignored or misunderstood it, this outline of sign language structure has had some success in that purpose. Fifteen years after its original publication, two articles on American Sign Language (ASL herein, also called "Ameslan") had appeared in LANGUAGE, the journal of the Linguistic Society of America; and in the eighteen years after its publication, papers on ASL and other sign languages have been presented at meetings and summer institutes of that and other linguistic, anthropological, and psychological associations. More than two thousand pages recording these and other scholarly contributions have appeared in a single journal, SIGN LANGUAGE STUDIES. (Begun with the invaluable help of Thomas A. Sebeok and his Research Center for the Language Sciences, in 1972, this journal, a semiannual at first, has been a quarterly since 1975.) In it besides linguistic studies, research on communicative behavior done in several disciplines can be found.

For a great many readers interested in the sign languages of the deaf, however, all these studies may impose at first too formidable an array of technical terminology and seem to demand too much specialized knowledge. It is in part for this reason that I have undertaken to revise this general outline of the structure of ASL—the first linguistic treatment of the language; and I hope that it may continue to serve as a useful introduction both for those beginning the study of gestural language systems and for those desirous of applying sound knowledge about sign language in their roles as parents or teachers of deaf children.

The method of noting down the signs, more properly the words, of ASL, used in the original work has also served much as intended, "to expedite the study of any gestural communication system with the depth and complexity of language." The use of this notation by students

of ASL and other sign languages has naturally brought modifications. The basic principles of the analysis and the notation system based on it remain valid, but after a generation of sign language study by a growing body of scholars, some restatement and clarification of these principles seems to be in order.

This revision is minimal—other works are to be consulted for a reading of the state of the art (for example, Battison's Lexical Borrowing in American Sign Language); and I hope soon to present a full account of two decades and more of research. Besides, many users of this outline wish to have it in substantially original form. I have therefore made only those changes I could not in good conscience refrain from, and show most of them that are more than editorial change within square brackets to set them off from the original text.

The original edition expressed the hope that some applications of the analysis and the notation system might be made:

> Second, the system of transcription presented here as a tool for analysis may recommend itself to the deaf or hearing user of the language as a way of recording for various purposes this hitherto unwritten language. Those whose work in education or other social service brings them into contact with deaf children or adults may find both the conclusions and the system of writing the language helpful and suggestive.

There have indeed been notable applications in teaching. In the United States, T. J. O'Rourke, one of the first critical readers of the outline, is now Director of the Communicative Skills Program, affiliated with the National Association of the Deaf. His "ABC", A Basic Course in Manual Communication (1970, revised 1973), is the most widely used text for teaching signs. His Special Study Institutes (Maryland 1971, Oregon 1972) helped to create a new generation of teachers alert to the nature of ASL and of English as well as to their differences and the kinds of manual representation of each. His collection of the lectures presented at the first of these Institutes (Psycholinguistics and Total Communication: The State of the Art, 1972) provides an excellent overview of the pedagogical

field. The First National Symposium on Sign Language Research and Teaching (Chicago, 1977; proceedings in press), planned by O'Rourke, celebrated the opening of a new era—bilingual, bicultural programs for deaf children in the United States may soon be educational actualities.

Other applications of the initial analysis are being made in Denmark, Sweden, and the United Kingdom. In Israel, France, and elsewhere attention to the sign languages of the deaf focused by developments since 1960 has gained the excitement of underground activity: Parents of deaf children and some teachers are meeting in secret to learn and practice the only kind of language directly accessible to a deaf child's functioning senses. Early application directly to teaching was made when Louie Fant borrowed the central principles of the 1960 analysis to organize the presentation of signs in his Say It With Hands (1964). Research in psycholinguistics, especially in the development of language in deaf children, has also made use of the original analysis of signs. Works by Bellugi, Lane, Boyes-Braem, Schlesinger and Meadow, McIntire, Hoffmeister, Goldin-Meadow and Feldman, as well as others, provide details. In this revised edition the analysis itself is presented along with references to those subsequent studies that advance our knowledge of American Sign Language.

To all who taught me from 1960 until now I can give only collective but most sincere thanks. Some of them have already been named above. I thank also Gallaudet College, for providing me since 1971 a research position and a series of incomparable experts at giving visible form to thought: Jean Dixon, Laura de Reitzes, and Kathy Burton; The National Science Foundation, whose continued support has brought me stimulating research colleagues: Cliff Abbott, Charlotte Baker, Robbin Battison, Lynn Friedman, Harry Markowicz, Carol Padden, the late Judy Williams, and James C. Woodward; Clare Hall, Cambridge (UK), for a 1977 Fellowship in a setting ideal for revision; all my deaf colleagues and friends, for letting me see their real language; and finally Ruth Stokoe, for her help in the press and in all else.

21 November 1978

SIGN LANGUAGE STRUCTURE

TABLE OF CONTENTS

1	INTRODUCTION	1
	History	2
	The Abbé de l'Épée	4
	Natural signs	5
	Sign Language in America	8
	Sign language theory	10
	French writers on Signs	12
2	THE LINGUISTIC COMMUNITY	16
	The Sign-Linguistic community	18
	The deaf child's early years	20
	Educational differences	22
	Psychosocial conclusions (Lunde)	24
	The CHEREME (cāre-ēem)	26
	Chart of handshapes used in American fingerspelling	28
3	CHEROLOGY [PHONOLOGY]	29
	Signs vs. fingerspelled words	30
	Finger counting, manual numeration	32
	Table of manual numeration	34
	Feature analysis of manual numeration	36
	The Three ASPECTS of a sign	38
	Convention of sign notation	40
	TABS located on the body in ASL	42
	Sign language phonetics	44
	DEZ and manual TAB handshapes	46
4	CHEROLOGY (continued): SIG/Action	51
	Linear SIG action	52
	Other conventions in notation	54

5 MORPHOCHEREMICS 55

Stylistic differences 56
Double DEZ relationships 58
Possible causes for sign change 60
Compound signs in ASL 62
Classes of color terms in ASL 64
Signs with initial letter DEZ 66

6 MORPHOLOGY 69

Questions and answers in ASL 70
Headshake as a signed negative 74
ASL syntax 76
Bilingualism and diglossia in deaf communities 78
A broader definition of language 80

7 AFTERWORD 81

The THREE aspects of a sign 82
Handshape & attitude in the DEZ 84
General and special theories of language 86

REFERENCES & INDEX OF NAMES 87

TABLE OF SYMBOLS USED FOR WRITING SIGNS vi & 68
(Also inside back cover)

Symbols Used for Writing Signs

Manually produced signs *of American Sign Language are written, first with a* **tab** *symbol to show* **where** *the sign action occurs:*

- ∅ *in front of signer's body*
- ○ *face or head region*
- ∩ *forehead or top of head*
- ⊔ *mid-face, nose, eyes*
- ∪ *chin, lower face*
-) *cheek, side of face, ear*
- ∏ *neck, throat*
- [] *trunk (shoulders to hips)*
- \ *upper arm*
- / *forearm, elbow*
- Ω *back of hand, wrist*
- Ɔ *inside of wrist*

Next *with a* **dez** *symbol for the handshape, and attitude*, of* **what acts:**

- A *closed hand*
- À *thumb extended hand*
- B *flat hand*
- B̈ *bent hand*
- 5 *fully spread hand*
- C *curved hand*
- E *retracted hand*
- F *loop and 3/finger hand*
- G *index finger hand*
- H *double finger hand*
- I *little finger (pinkie) hand*
- K *'k' hand of fingerspelling*
- L *angle hand, thumb & index*
- 3 *thumb & 1st 2 fingers spread*
- M *similar to* B̈ *or* O
- R *2nd finger crosses index*
- V *'victory' hand, spread*
- W *3 fingers spread, thumb on pinkie*
- X *index finger bent*
- Y *'y' hand of fingerspelling*
- 8 *mid-finger in from spread hand*

Then *with one or more* **sig** *symbols to show the sign* **action:**

Motion

- ^ *up*
- v *down*
- N *up & down*
- > *rightward*
- < *leftward*
- z *side to side*
- T *toward signer*
- ⊥ *away from signer*
- I *to & fro*
- ⊛ *in a circle*

Internal (hand or finger)

- ɳ *bend*
- ƨ *wiggle*
- □ *open*
- ⋕ *close*

Interaction: hand w/ hand or body

- ϰ *approach*
- × *touch*
- ⋿ *link or grasp*
- † *cross*
- ⊙ *enter*
- ÷ *separate*
- ↔ *interchange*
- ~ *alternate*

* **Subscripts** *show how* **dez** *(D) is held:*

- D_{Ω} *supine (palm up or back)*
- $D_{\supset}$ *pronated (palm down or out)*
- $\not D$ *forearm near vertical*
- $D_{<}$ *salient finger to left*

Diacritics *show detail of* **action:**

- ʎ *sharp upward motion*
- ×·· *repeated touching action*

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1 INTRODUCTION

Purposes. The primary purpose of this monograph is to bring within the purview of linguistics a virtually unknown language, the sign language of the American deaf [community]. Linguistic examination of this language system of visual symbols has led to conclusions about its structure that add to the sum of linguistic knowledge. Moreover, the analysis of the structure of the word-like units has led to a method of transcription that will expedite the study of any gestural communication system with the depth and complexity characteristic of language.

Second, the system of transcription presented here as a tool for analysis may recommend itself to the deaf or hearing user of the language as a way of recording for various purposes this hitherto unwritten language. Those who work in education or other social service with deaf children or adults may find both the conclusions and the system of writing the language helpful and suggestive.

History. Communication by a system of gestures is not an exclusively human activity, so that in a broad sense of the term, sign language is as old as the race itself, and its earliest history is equally obscure. However, we can be reasonably certain that, even in prehistoric times, whenever a human culture had the material resources, the familial patterns, and the attitudes toward life and "the normal" that allowed the child born deaf to survive, there would grow up between the child and those around a communicative system derived in part from the visible parts of the paralinguistic but much more from the kinesic or nonverbal communicative behavior of that culture (Trager 1958). Based on the patterns of interactive behavior peculiar to that culture, the communication of the deaf child and hearing companions would develop in different ways from the normal communication of the culture. To take a hypothetical example, a shoulder shrug, which for most speakers accompanied a certain vocal utterance, might be a movement so slight as to be outside the awareness of most speakers; but to the deaf person, the shrug is unaccompanied by anything perceptible except a predictable set of circumstances and responses: in short, it

has a definite meaning. That shrug would certainly become more pronounced, even exaggerated, in the behavior of the deaf person and probably also in that of hearing partners in communication. [For an account of an actual counterpart of this hypothetical example, see the article by Kuschel, The Silent Inventor, in SIGN LANGUAGE STUDIES 3 (1973); Kangobai, Kuschel's "silent inventor" was the first deaf person recorded in twenty-two generations of his island's history.]

This hypothetical discussion of the origin and development of the gesture language of a congenitally deaf individual in any society is not to be taken as a prejudgement of the vexed question of language genesis; [but see Wescott 1974, Kendon et al. 1975, Harnad et al. 1976, Stokoe 1978—the study of sign languages is at the center of the new interest in the old questions of language origin and evolution]. Surely total response of the organism precedes the selection of vocal or manual or facial signalling systems, but special signalling systems of the deaf, though a reversion in a way to the earlier communicative patterns of the race, can only develop in a culture built, operated, and held together by a language. [The dilemma posed by Neanderthal Man, who had human culture but may have lacked articulate speech (Lieberman 1975), can be resolved by presuming that Neanderthalers used a sign language of hand, arm, facial, and bodily gestures with or without vocal accompaniment.] The kinesic, or more broadly, the metalinguistic communicative phenomena out of which the primary communicative patterns of the deaf are built may once have been the prime sign phenomena, with vocal sounds a very minor part of the complex; but it cannot have been until long after full development of human speech as we know it that human cultures had advanced to a point where individuals deprived of the normal [use of one of the senses and normal] channels of communication could be given a chance to develop satisfactory substitutes.

Whenever such a chance of surviving and experimenting was afforded to those who could not hear, the supposition is strong that they would group themselves and hence develop their visual communication systems in ways still more divergent from the communicative norm

than would be the case if the deaf individual had remained alone among hearing siblings, parents, or friends. To support the supposition there is both biological and linguistic reasoning. Many of the diseases that in modern times cause deafness in the infant before speech develops would have been immediately or soon fatal in earlier times; but much congenital deafness is hereditary, not only occurring in all periods of history but tending to give the deaf child one or several siblings or parents or more distant relatives similarly affected (Nance 1974). The linguistic argument is simple but strong: The effect on social grouping of having or lacking a common language is obvious and intense enough ordinarily, but when the difference is not between dialects or languages but between having or lacking a spoken language, the effect is enormously intensified.

There are records of successful attempts to teach persons deaf from birth to communicate in more socially acceptable ways than by gesture, namely, by reading and writing, by manually spelling out sentences, and by lipreading and producing artificially acquired speech. But in the long stretch of time from antiquity to the middle of the eighteenth century these amount to the merest scattering of instances .

The French connection. The real history of the sign language to be examined in this study begins in France in 1752. In that year the Abbé Charles Michel de l'Épée undertook the teaching of two deaf and mute sisters. What distinguished him from other brilliant practicioners in the art of teaching language to the congenitally deaf was an open mind and a boundless charity. While others had instructed one or at most a handful of pupils, and seeking reputation and wealth, had paraded their successes while making a mystery of their methods, Épée gave his life, his considerable private fortune, and his genius to a school that in theory at least was open to every child born deaf in France, or in all of Europe. For nearly three decades he taught in and directed the school, making known its results only through monthly demonstrations open to the public and learned societies, until 1776, when he felt it necessary to answer criticism of his methods by rivals in a full exposition of his theory and practice.

This work, L'institution des sourds et muets, par la voie des signes méthodiques (Paris, 1776), shows clearly that the basis of his success is an amazingly acute grasp of linguistic facts. A few years before Épée began his career, Jacob Rodrigues Pereira had come from Portugal to France and begun teaching deaf-mutes. His method was to begin with practice in articulation and much later to teach writing and reading with the aid of a one-hand manual alphabet. Although one of Pereira's pupils, Saboureaux, was a striking example of his success, composing works on the education of the deaf, and attacking Épée in print, there is no doubt that demonstrations of the Pereira method could be misleading. As Épée says, a pupil taught to recognize the manual alphabet and form letters with a pen could demonstrate great decoding and encoding ability without really understanding anything of what he wrote; or a pupil could pronounce with fair intelligibility every French syllable without comprehending anything. In short, the language of the Pereira method was French, taught through articulatory exercises, ordinary writing, and a set of manual symbols corresponding to the letters of the alphabet.

Épée's pupils also demonstrated their ability to write correct and elegant French. But they could also reason and answer questions calling for opinions supported by education in depth. What is more, Épée's speeches to them were given, not in a one-for-one representation of French orthography, but in one or the other or both of two very interesting sign languages.

The difference between Épée and all his predecessors as well as many who followed him is his open-minded recognition of the structure of the problem faced by the deaf person who confronts a spoken language. Épée could see his own language objectively and analyze its grammar in a way that made possible its transmission to and synthesis in the mind of a bright teenage congenitally deaf pupil in just two years. He could also see the mind of a pupil as a human mechanism functioning by means of a language, without being alarmed at the fact that this language was not French. His detractors seem to have treated pupils as automata into which the French language—that is, its pronunciation and orthography—could be built with the aid of suitable coding devices.

Although not the first to recognize the existence of a sign language among the deaf—Montaigne two centuries earlier had been struck by its precision and rapidity

(Essays 2:29)—Épée was the first to attempt to learn it, use it, and make it the medium for teaching French language and culture to the deaf of his country. The language of the deaf he called le langage des signes naturelles 'the natural language of signs', as have writers for the next two centuries. But for teaching the intricacies of French grammar, and through it the art of abstract thought, he devised what now would be called a meta-language: This was his system of signes méthodiques.

What Épée called the language he discovered, "the natural language of signs", is a term with a long and varied history. Since 1776 its denotation has changed with the metaphysical and linguistic theory of the time. Particularly interesting is the psychological and epistemological thought behind the use of the adjective natural. Some of those who use it are confident that throughout all time there is a necessary and unbreakable connection between a sign and its meaning—a connection not found between a word of language and its meaning. Thus for example, Valade (1854) writes:

> Les signes sont naturel quand ils ont, avec l'objet de la pénsée, un rapport de nature tel qu'il est impossible de se méprendre sur leur signification. Ils ont une valeur qui leur est propre et qu'acune convention ne peut changer.
> [Signs are natural when they have with the object of the thought an association by nature such that it is impossible to misunderstand their meaning. They have a value that is proper to them and that no convention can change.]

Épée, in his use of the term, is less the metaphysician and more the linguist, but even he concludes his 1776 account of his instructional method with a Projet d'une langue universelle par l'entrimse des signes naturelles assujétis à un methode [A project for a universal language through the medium of natural signs regulated by a method].

Actually "the natural language of signs" is a fiction, an artifact of language and the English language article system. A natural sign language must be something like what is described above (pages 1f). Any extremely close non-arbitrary relation of gestural sign made by human

agency to its referent will be in those areas of activity where pantomime and denoted action are nearly identical, e.g. eating. Or it will occur in cases where pointing is as clear as or clearer than any spoken language: 'you', 'me', 'up', 'down', 'there', etc. Most gestural signs taken as natural, necessary, and unmistakable are of course just those parts of the total communicative activity of a culture that relate to a specific object, situation, or response in that culture. The following list from Arrowsmith's Art of Instructing the Deaf and Dumb (London, 1819) contains some of all three kinds of "natural" signs (iconic, indexic, and culturally tied):"yes, no, good, bad, rich, poor, go, come, right, wrong, up, down, white, black, walk, ride..." But whether a nod or some other gestural sign was the "natural" sign for 'yes' in England in Arrowsmith's time, that sign is just as arbitrary in choice and just as culturally determined in its use for its meaning as is any syllable or morpheme in a vocal system.

Épée realized that this natural language, indispensable as it was in the day to day existence of uninstructed deaf-mutes, was insufficient as a medium for teaching French language and culture. When the language had a sign that could be used for a certain element of French, he used or adapted it. He found, for example, that the pupils he observed signified that an action or event was in the past by "throwing the hand back beside the shoulder once or repeatedly." In his instructional manual he shows how he teaches the past tenses of French verbs in connection with the days of the week, and shows also how he introduces some of his signes méthodiques. He uses one backward motion of the hand over the shoulder to indicate the simple past, two coups de la main for indicating the perfect tense, and three for the pluperfect tense. [The pupil of course was expected to memorize the paradigms for conjugating the French verb and use the hand over shoulder indication as the guide to picking the correct form.]

When the language of "natural" signs lacked a sign, as it did for the articles, Épée invented one out of hand. He assigned the definite masculine article le a crooked index finger at the brow, la the same finger at the cheek. For some of the signes méthodiques invented by Épée and his successor Sicard the explicit etymology given by the

inventor can be trusted; folk etymologies often imparted to the hearing student of ASL along with the sign are interesting but untrustworthy guides. Épée says the crooking of the index finger was a reminder to the pupil that the definite article chooses one of many possible instances of its noun; the brow location was chosen because of the masculine custom of tipping or touching the hat brim; the cheek is the locus of the feminine article sign because as he notes the coiffure of ladies of the period often presented hanging curls there.

Another of Épée's inventions shows how he fashioned a bridge between natural signing and French manually presented. He found it necessary to have several signs for the preposition and other function words, not because the deaf sign language could not express relationships, but because the exact word demanded by idiomatic French had no single sign equivalent [or none he had yet discovered]. One such coinage was his sign for the preposition pour 'for'. He says it begins with the index finger pressed against the forehead as the seat of reason or intention and terminates with the finger pointing toward its object. The sign FOR in American Sign Language is still made identically.[1]

Épée's work shows an acute awareness of the several levels on which he was working. Gaining the confidence of his pupils by his ability to converse with them in their own "natural" language, he could introduce them to the quite foreign French language in all its formal elegance, through the meta-language of his signes méthodiques. His pupils still in school could demonstrate letter-perfect transcriptions when dictated to in constructions of these methodical signs; but his finished students, who from the first became the primary teachers in the school, had thoroughly learned French and could translate from natural sign language into literary French with a considerable saving in time; or they could just as easily transmit the import of written French to their own pupils by using natural sign language.

It is greatly to be regretted that from Épée's day to the present, his grasp of the structure of the situation of the congenitally deaf person confronted with a language of voice and hearing has escaped so many working in the same field. Épée died in 1789 and was succeeded by Sicard, who

[1] Words in capitals stand for ASL signs, for which they are conventional glosses.

had studied with him earlier and been put in charge of the institute on the Parisian model founded in the pre-Revolution days at Bordeaux. Sicard is credited by some with even greater success than his master in bringing the most gifted of the deaf pupils to the highest levels of intellectual attainment. Certainly two of his proteges, Massieu and Clerc, wrote and reasoned with a skill outstanding among their hearing contemporaries. Clerc's articles in the early volumes of the American Annals of the Deaf (1847—) are remarkable for their lucidity, good sense, and complete lack of the mannerisms of style that date the writing around them in that journal. [An excellent account of Sicard, short of the full biography that is needed, is to be found in The Wild Boy of Aveyron by Harlan Lane (1976).]

Gallaudet and Clerc. In 1815 Thomas Hopkins Gallaudet was sent to Europe by a group of public spirited citizens of Hartford, Connecticut, to study the methods of teaching the deaf. Visiting England first, he found little encouragement, but he met Sicard in London, was invited to visit the now famous school in the Rue St. Jacques in Paris, and was introduced to the use of signs in teaching the deaf. With mixed feelings Sicard also allowed Gallaudet to hire and take back to America his deaf assistant, Laurent Clerc, along with his knowledge of signing. Clerc became the first deaf teacher of the deaf in the United States at the American School for the Deaf that was established with Gallaudet as head at Hartford in 1817. The New York School for the Deaf was opened soon after, and a large number of similar schools were founded in the next few years, almost all of them with a teaching staff wholly or in part indoctrinated in the sign system of Épée and Sicard by the young deaf Frenchman, Clerc.

Diglossia. The sign system used for instruction in France and in America in the early years of the nineteenth century combined two languages of signs, the natural and the methodical, which must have tended to become two varieties of one gestural system from the first. [See "Diglossia" by Ferguson (1959), "Sign Language Diglossia" (Stokoe 1969), and "Signs of Change" (Woodward 1976).] The advantage of having, instead of the "home made" gestures of the uninstructed, a sign language similarly executed

but designed to translate French language and the whole culture to which it was the key must have impressed every deaf signer who encountered it. One may guess that some notion of the French system had preceded Gallaudet's formal introduction of it to the United States. [In fact it was Sicard's book purchased by Dr. Cogswell for what it might contribute to Gallaudet's tutoring of Alice Cogswell that led to the European journey.] How else explain the rapid flourishing of the language and the schools using it to the point where a national college for the deaf was deemed necessary and established by Act of Congress in 1864? [See Hodgson 1953, Stokoe 1974, and Woodward 1976 on the spread of the sign language method and schools.]

The present American Sign Language stems both from the natural signing of deaf persons and the methodical sign language of Épée and Sicard, but even the natural elements [both French and native, as Woodward convincingly argues] have become fixed by convention or the regular working of linguistic laws so that they are now as arbitrary as any, and users of the language today are disdainful of "home signs" as they call those signs that arise from precisely the same conditions that generated the "natural" signs but that have local and not national currency.

Much condensed, this brief history has not always distinguished between signs themselves, which are quite analogous to words, and a sign language, which is a system with levels corresponding to phonological, morphological, and semological organization. Actually, one might distinguish not two but three kinds of signs: natural signs, whether home signs or the accepted signs of a sign language in regular use in a larger community; conventional signs, which are coinages with or without direct borrowing from another language; and methodical signs, which in origin at least were sign-like labels for grammatical features of another language and were used only or mainly in teaching that language. Toward the latter two kinds the language of signs seems to have behaved as other languages behave toward borrowings. [See Lexical Borrowing in American Language by Robbin Battison (1978) for complete exposition of this point.] When the social and educational revolution

in the life of the deaf begun by Épée flooded the original language with new vocabulary, the language adopted many of these conventional signs. But the meta-language of the methodical signs was a different system (analogously the language of computer programmers is different from English they speak and write); and its contributions could be only individual signs (such as FOR), which came into the sign language with the same status as the conventional signs. That the French language, and later the English language, through the medium of methodical signing and persons bilingual in spoken and signed languages, affected the syntax of the sign language actually in use by the deaf may be suspected. [See Frishberg 1975, Woodward 1976.]

Early s.l. studies. Studies of the sign languages of the deaf uncomplicated by prescriptions for its use in teaching, by controversy about the use of signs at all, or by special pleading for its use as a universal language of mankind [were] not to be found [before 1960]. The work of Épée, despite its emphasis on the teaching of French grammar, is valuable both for its scattered descriptions of the "natural" signs of the uninstructed and for its attitude toward the language and its users. None before him and all too few after him have been willing to face the fact that a symbol system by means of which persons carry on all the activities of their ordinary lives is, and ought to be treated as, a language.

Various bibliographers have credited Épée with the beginning of a dictionary of signs completed and issued by Sicard. In fact Sicard's work, Théorie des Signes (Paris 1808), is a two-volume list of French words arranged by subject matter, not alphabetically, and given with verbal directions for their representation in manual signs. Most of the words require at least three signs for their rendering: a base sign for the lexical meaning; a sign to show whether the lexeme is verb, noun, adjective, or other part of speech; and further signs as needed for determining case, gender, number, etc. This systematically logical way of rendering French vocabulary and semantics in gesture and pantomime is in many ways similar to the New Sign Language invented by Sir Richard Paget, except that a word in the latter begins with determinants such as a sign for 'abstract' or

'concrete' before a noun, and progresses by way of a sign for the subject category to the particular sign (The New Sign Language: Notes for teachers. London, Phonetics Department, University College, mimeo, undated).[Pierre Gorman subsequently revised Paget's manual code for the lexicon of English to make it more suitable for colloquial use as well as classroom use with young deaf or otherwise handicapped children. Known now as the PGSS (for Paget-Gorman Sign System) it is undergoing careful psycholinguistic evaluation in two school populations (Fenn 1976) and other experiments with its use are in progress in British schools.

[American education of the deaf now has not one but several systems similar in principle. Like the PGSS in attempting to represent English words exactly, and like the French methodical signs based in part on signs that they borrow from the natural language of the deaf, the first of these, Seeing Essential English (David Anthony and associates, 1971) involved in its development the originators of two variant systems, Linguistics of Visual English (Dennis Wampler 1971), and Signing Exact English (Gustason, Pfetzing, & Zawolkow, 1972). In addition to these, Harry Bornstein and a group of associates at Gallaudet College have been developing teaching materials and testing in preschool and home settings a similar sign system called Signed English (1973).]

A different approach to the French Sign Language is apparent in the work of Bébian (1825). His Mimographie is a most ingenious attempt to devise a system of writing for the natural sign language then in use. He was a teacher at the Paris school under Sicard. His method of writing the signs is analytical, but his avowed purpose is to compose a vocabulary or dictionary of signs to serve as a regulator of the language—much as the Academy and Dictionary served that function for the French language. [At any time in the history of any language used in formal educational settings there must be a majority of teachers concerned to regulate and standardize the language in which the creativity of constant generations of students produces bewildering variation.] Considering the stage that linguistic thinking had reached in his time, Bébian's work is excellent in conception and execution. His symbols

for representing the hands and other parts of the body involved in the sign are natural enough to be easily remembered and at the same time sufficiently conventionalized to be rapid and economical. He also used a few "diacritical" marks to denote facial expressions: 'questioning', 'surprise', 'reverence', and so on. Movement seems the least well-handled part of his system, but there is a possibility that his writing system, as judged by one familiar with present ASL, falls short of succinct and precise description because the natural FSL itself in his time lacked uniformity. For example, the modern ASL signs CHAIR and NAME are quite regular in formation: Both use the index and second fingers of both hands extended but not spread apart, and both cross these fingers of one hand over the same fingers of the other hand . The only distinction is the rotation of the forearm; if the index finger edge of the hands is uppermost, striking the dominant hand across the other means 'name'. If the arm is pronated, to turn the palm downward on both hands, the same action and handshapes means 'chair' or 'sit'. But in Bébian's time, although 'name' was signed in FSL as it now is in ASL, the sign for 'chaise' was pantomimic: the signer making a more or less realistic attempt to sit in an imaginary chair. (The authority for FSL CHAISE is the picture sign dictionary of Pelissier discussed below.)

In his Études sur la Lexicologie et la Grammaire du Langage Naturel des Signes, Y.-L. Remy Valade (1854) rejects Bébian's system as too cumbersome and its symbols as too numerous. He retains, however, the former's purpose: to make a dictionary that will regularize and standardize signs to make more uniformity both in the language and in the education of the deaf. Valade understands very well why a dictionary of signs cannot be expected to resemble, or fulfill the same function as, a standard French dictionary. What he projects is in short a French-Sign Language word book. In the projected work, following each entry of a French word with information about its etymology and grammatical use would be a description of the natural sign which that word most nearly translates. Henceforth, he says, the French word can stand for the sign, and could be used for the sign instead of cumbersome notation in writing French sign language.

[The objection on linguistic grounds to this lexicographical project of Valade—as to all manual codes for representing the words of a spoken language by signs—is that it assumes an exact congruence between a word of a natural sign language, FSL or ASL, and a word of French and English. There are no two languages anywhere that exhibit a one-for-one correspondence in their words and meanings. When one tries to map the vocabulary of a sign language onto the vocabulary of a spoken language, however, an even greater discrepancy is apparent. Using sight instead of sound as transmission medium, a natural sign language differs in phonology, morphology, syntax, and semantics from a natural spoken language; and so a sign-word pairing misrepresents the nature of the relationship of the two languages unless one adopts the principle of Humpty-Dumpty and insists that he uses a word or sign to mean only and always just what he has in mind.]

These considerations of the nature and function of the lexicological task, and the rejection of graphic symbols in favor of skillfully worded descriptions of signs are echoed in two recent [1960] discussions of the sign language of American Indians. Voegelin (1958) and Kroeber (1958) disagree about the importance or priority of lexicology in analysis and description of this language, which is in some ways intricately related to the sign language of the American deaf. [These essays have been reprinted in the photomechanical reissue of Mallery's 1881 work (1972).]

Valade's studies begin with lexicography, but he also makes some interesting observations on the syntax of the natural language of signs. Like all the Épée school of grammarians, he is able to get sufficiently outside his own language to compare sign language grammar with French, Latin, and English grammars objectively. For example, he states that the syntax of sign language has no need for the copula in such statements as 'the corn is green' or 'the girl is beautiful', because the visual juxtaposition of the signs for substantive and adjective serve the same purpose as would a form of <u>be</u>. Such an analysis is much superior to the conclusions sometimes encountered [and still encountered in the textbooks used in preparation of teachers for the deaf] that the sign languages of the deaf have no grammar or regular syntax

or that the absence of systems of verb inflection argues a defect in the language or a cognitive deficit in the user that stems from hearing impairment. Valade's conviction, however, that the order of signs in an utterance is closer than that of French or English to the "natural" order of occurrence or importance still lacks empirical confirmation.

A different treatment of signs is given in a treatise on deaf education by Pelissier (1856). He gives some four hundred drawings (with dotted lines and arrows to indicate movement), each captioned with the French word it translates. [Insofar as a drawing is visually more prominent than a word in print near it, the Pelissier treatment comes nearer to the linguistic fact—especially if the reader focuses on the picture and accepts the word only as a suggestion in locating the pictured sign's meaning. Lambert (1865) also rejects explicitly the word-to-sign pairing implicit in the methodical signs, which he associates with the national institutes founded on the Épée-Sicard principles. Lambert's own lexicon of what he considers the signs naturally used by the deaf without the doubtful advantage of an institute education comes in three parts: a set of plates with tiny engravings of signs at some point in their making; a dictionary of "simple" signs (single signs); and a dictionary of signes composées (two or more signs made in succession to render a French word). Here like Sicard two generations earlier, Lambert shows how the meaning of the French word listed is to be signaled by using two or more of the simple signs.]

The French writers reviewed here are primarily educators of the deaf. Among them Épée, Sicard, Bébian, and Valade are grammarians as well; Pelissier, however, writes less for the theoreticians than for a new group to be reckoned with. In less than a century after Épée flourished, a linguistic community had developed, and a committee composed of deaf adults instructed in the Parisian and similar French schools, and of interested hearing persons, were making their views felt in the linguistically complicated educational controversies. Their interest was in the use, the extension, and the public acceptance of their language, which from Pelissier's iconography appears to be the "natural" sign language with a difference. In 1856-1865, this language retained

apparently some of the signs encountered by Épée when he met his first deaf signer. Pelissier's and Lambert's lists include many coinages, conventional signs, and signs that are obviously derived from the "methodical" signs of the institutes. Pelissier's work, as his title indicates, attempts to use the language as a means of dispelling the mystery that had surrounded the teaching of deaf persons since the middle ages (L'Enseignement Primaire des Sourds-Muets mis à la portée de tout le Mond avec une Iconographie des Signes): Does one wish to teach French to a deaf-mute? he asks. Let him learn the latter's language and proceed from there. This rationale as well as the language was imported by the Americans, as this resolution of the World Congress of the Deaf held in St. Louis in 1904 proclaims:

> The educated deaf have a right to be heard in these matters and they shall be heard.
>
> Resolved, that the oral method, which withholds from the congenitally and quasi-congenitally deaf the use of the language of signs outside the school-room, robs the children of their birthright; that those champions of the oral method, who have been carrying on a warfare, both overt and covert, against the use of the language of signs by the adult, are not friends of the deaf; and that in our opinion, it is the duty of every teacher of the deaf, no matter what method he or she uses, to have a working command of the sign language (American Annals of the Deaf 57, 1904).

[The resolution quoted here contains an opinion as valid near the end of the century as it was at the beginning, and it is gratifying to be able to say in 1978 that since 1960 more and more teachers of the deaf appear to be paying heed to it. An excellent statement of the state of affairs in 1977 can be found in the proceedings of the First National Symposium on Sign Language Research and Teaching held in Chicago at the end of May and beginning of June.]

2 THE LINGUISTIC COMMUNITY

Application of the techniques of the sociologist and cultural anthropologist to the linguistic community formed by the deaf is as new as is linguistic analysis of their language. Much of the information about the group, which is desirable to have as a background for consideration of the language, is lacking; but the writer is most fortunate to have been associated in the first years of the new Gallaudet College research program with Dr. Anders Lunde, whose paper "The Sociology of the Deaf" is the pioneer work in the field.

Dr. Lunde has graciously permitted the quotation here of substantially all of this paper, first presented at the 1956 meeting of the American Sociological Society in Detroit. Its information is most pertinent here, and its delineation of areas where research is needed may lead to further collaboration of sociologist and linguist. He writes:

"The deaf as a group fall into a completely unique category in society because of their unusual relation to the communication process and their subsequent adjustment to a social world in which most interpersonal communication is conducted through spoken language. No other group with a major physical handicap is so severely restricted in social intercourse. Other handicapped persons, even those with impaired vision, may normally learn to communicate through speech and engage in normal social relations. Congenitally deaf persons and those who have never learned speech through hearing (together representing the majority of the deaf population) never perceive or imitate sounds. Speech must be laboriously acquired and speechreading, insofar as individual skill permits, must be substituted for hearing if socially approved intercommunication is to take place. The rare mastery of these techniques never fully substitutes for language acquisition through hearing.

"With his acoustical impairment as a background, the deaf person undergoes certain conditioning social experiences that separate him from the hearing and tend to make him a member of a distinct subcultural or minority group.... The sociology of the physically handicapped is

a neglected field; a few texts barely touch upon this subject and then, in the case of the deaf, often inaccurately. Only a handful of articles pertaining to the role of the physically handicapped in society has appeared in sociological journals.

"The deaf may be identified as a group for sociological purposes. They are to be distinguished from those who are 'hard of hearing', or those of partial hearing who can hear with the use of mechanical or electronic hearing aids, and those who become deaf late in life after having acquired speech through hearing and associated, in normal communication, with hearing persons. By and large, the deaf group as a whole never used hearing for speech. The available evidence, which is incomplete, seems to indicate that approximately 39 percent of the total deaf population was born deaf, that another 19 percent became deaf by the end of two years of life, and that an additional 28 percent became deaf between the ages of three and five (Best 1943). [See Schein and Delk 1964 for more recent information on the deaf population.] This means that approximately 58 percent of the deaf never used hearing for speech and that 86 percent of the total deaf population was deaf by age five. The social implications of this fact are extensive; the deaf as a group have never undergone the normal experiences of socialization during the formative years.

"The deaf may be defined therefore as a group composed of those persons who cannot hear human speech under any circumstances and consequently must find substitutes (in speechreading, language of signs, etc.) for normal interpersonal communication. The definition as applied to the group discussed in this paper is to be understood to include only those persons who become deaf at a relatively early age in life (or are born deaf) and who, for the most part, undergo the special institutional experiences analyzed below. As far as can be determined from available data, this group numbers around 100,000 persons, although some estimates of a more loosely defined deaf population go as high as 180,000 persons. Censuses of the deaf were taken from 1830 to 1930 and were discontinued for reasons of inconsistency and under-enumeration. In 1930, 57,084 persons who had become deaf before eight years of age were

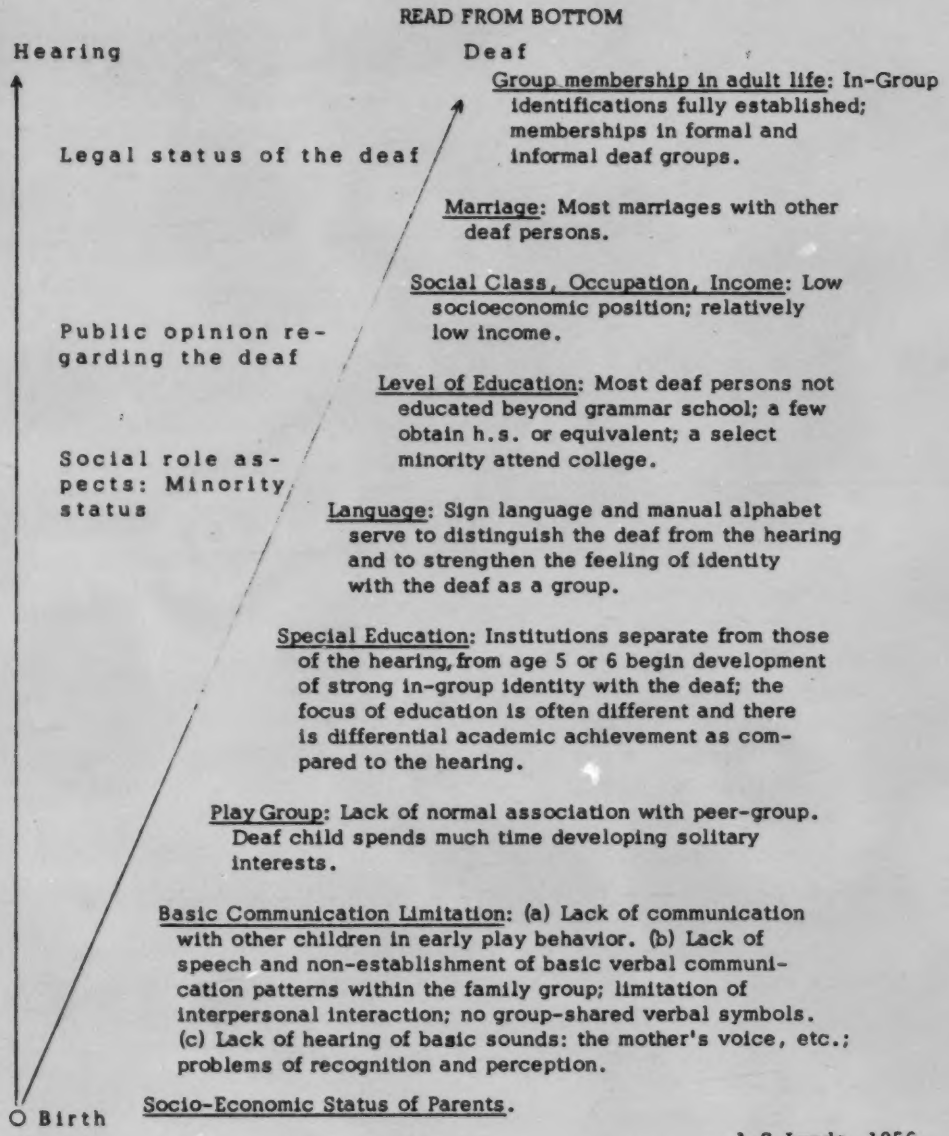
enumerated (15th Census of the U.S. 1930, 'The Blind and Deaf-Mutes of the United States 1930', Washington, Bureau of the Census, 1931). Estimates based on the U.S. Public Health Survey of 1935-36 indicated a total deaf population of 170,000 in 1950. Of these it is estimated that approximately 100,000 could be classed as not having used hearing for speech (Bachman 1952).

"The deaf person is often taken as an individual adrift in a hearing society; while this may occasionally be the case, for the most part the deaf person is a member of a well-integrated group, especially in urban areas. How he becomes cast as a member of such a group may be investigated by means of a hypothetical life-cycle as illustrated in Figure 1.

"It may first be noted that sociological research could throw considerable light upon the etiology of deafness. There appears to be a prevalence of deafness among lower income families, reflective of inadequate medical care and services in infancy and childhood. Beasley (1940) observed a direct relationship between family income and incidence of impaired hearing in the Public Health Survey of 1935-36.

"The deaf child begins his life separated from the normal associations with the hearing world to a degree not yet investigated. According to various observers, sound and hearing are extremely important for orientation from the first moment of life. The hearing child spends considerable time during the first four weeks of life 'responding' to sound; at the end of 16 weeks the child seems to identify sounds (Gesell & Ilg 1953). By 28 weeks he is at Esper's stage of sound imitation, vocalizing vowels and consonants which will soon take the status of words (Esper 1935, Klineberg 1940).

"Toward the end of the first year the stage of verbal understanding begins; by 2 1/2 years the use of spoken language is understood. By 3 years the hearing child begins the development of logical expression in words and sentence structuring, and through the expression of ideas, becomes aware of 'self'. At 4 years he asks 'Why?' questions, is becoming oriented and plays conversationally with his group. At 5 years the hearing child begins to discuss more remote and difficult problems such as war and crime in


READ FROM BOTTOM
Hearing
Deaf
Legal status of the deaf
Public opinion regarding the deaf
Social role aspects: Minority status
Group membership in adult life: In-Group identifications fully established; memberships in formal and informal deaf groups.
Marriage: Most marriages with other deaf persons.
Social Class, Occupation, Income: Low socioeconomic position; relatively low income.
Level of Education: Most deaf persons not educated beyond grammar school; a few obtain h.s. or equivalent; a select minority attend college.
Language: Sign language and manual alphabet serve to distinguish the deaf from the hearing and to strengthen the feeling of identity with the deaf as a group.
Special Education: Institutions separate from those of the hearing, from age 5 or 6 begin development of strong in-group identity with the deaf; the focus of education is often different and there is differential academic achievement as compared to the hearing.
Play Group: Lack of normal association with peer-group. Deaf child spends much time developing solitary interests.
Basic Communication Limitation: (a) Lack of communication with other children in early play behavior. (b) Lack of speech and non-establishment of basic verbal communication patterns within the family group; limitation of interpersonal interaction; no group-shared verbal symbols. (c) Lack of hearing of basic sounds: the mother's voice, etc.; problems of recognition and perception.
Socio-Economic Status of Parents.
O Birth

—A.S. Lunde, 1956

Figure 1. Social Factors in the Isolation of Deaf Persons and the Establishment of a Social Group of the Deaf: Read from the bottom, the chart shows the lines of social divergence from birth through adulthood.

common with friends, and attacks the problems of sex, time, space, death, and God (Gesell & Ilg 1947). By the time he enters school the hearing child is equipped not only with a background of information but with the ability to express himself in language.

"The deaf child is cut off from these experiences; he lacks the orientation provided by the hearing association with his family and play groups. As most studies of personality have been made of the deaf child in the school situation, that is after the age of five or six, there exists no available information on the first years of deafness. We do not know exactly how the deaf child learns, orients himself, becomes aware of himself or of his position in the group. Further research into the operation of socialization and personality formation of the deaf is urgently required. [Notable advances have been made in this direction since 1960; see especially Schlesinger and Meadow, Sound and Sign (1972), Mindel and Vernon, They Grow in Silence (1971), and Spradley and Spradley (1978).]

"The relation of the deaf child to his family has not been entirely investigated. It is generally understood that many parents do not learn of their child's deafness until the child is two or three years of age. Patterns of reaction ranging from rejection to oversolicitous behavior have been observed. The role of the parent in the life of the deaf child, the effect of parental rejection or overprotection, the relation of the deaf child to the other members of the family (i.e. sibling relationship)... indeed the total family environment of the child during the first six years of life have not been adequately investigated.

"The social isolation of the deaf child may be increased in the play group experience. While few studies are available in this area, it is obvious that lack of verbal communication must be a retarding factor operating to limit interpersonal experience in peer-group relationships. Brunschwig (1936) found, for example, that deaf children had a smaller number of playmates at any one time than hearing children and they engaged more frequently in solitary activities.

"The typical deaf child next enters the school for the deaf. In 1955 there were 23,033 children being taught in educational institutions for the deaf in the

United States (American Annals of the Deaf, January 1956). Of these, 66.3 per cent were full time residential children and 33.7 per cent were day school or day class children. [Twenty-two years later more than 600 programs are reporting on nearly seventy thousand deaf students to the Annual Survey of Hearing Impaired Children and Youth, the Office of Demographic Studies, Gallaudet College.] With respect to social isolation some preliminary studies have indicated that the institutional experience may further remove the child from contact with the hearing world as compared with the day school, from which the child returns daily to the normal environment of home and community associations. Some data tend to support the hypothesis that the residential school experience retards social development (Streng & Kirk 1938, Burchard & Myklebust 1942, Avery 1948). Burchard and Myklebust found that the longer the period of residence in a residential school the lower the social maturity quotients on standard tests (1942:241-250). There is not sufficient evidence to warrant any conclusions concerning the effect of attending a school for the deaf; if there are negative aspects, there are also positive aspects which should also be investigated. [For example consider the strong effect that long residence in such a school has on the social network linkages of persons in the foremost subgroups of the deaf elite (Stokoe, Bernard, & Padden 1976).]

"The curricular programs in schools for the deaf vary, and progress for each student is individualized to a considerable extent. The burden of teaching basic communication, speechreading, reading, and writing takes precedence over course work as such. The omission of sign language is significant [neither Dr. Lunde nor the writer knows of any school where instruction in sign language itself is part of the curriculum]. The deaf child, already retarded in communication ability is further limited in academic development. Thus the system of education as well as the institutionalization itself plays a role in comparative retardation, the deaf child being trained academically at a pace much slower than the hearing child. This further widens the gap between the hearing and the deaf, taken as groups.

"The education of the deaf is further restricted by the fact that there are only twelve accredited high schools for the deaf in the United States (American Annals of the Deaf, January 1956). The majority of the deaf do not obtain a high-school

education or its equivalent. This places them as a group on the lower levels of educational achievement, another factor in group segregation and which affects their chances for higher education and better employment opportunities.

"It is at the school for the deaf that most deaf children meet other children like themselves for the first time and enter into peer-group associations without the restrictions the special handicap imposed in their relation with hearing groups. They begin to develop feelings of identity with the deaf group and to acquire the group attitudes that tend to set them apart. Preliminary studies at Gallaudet College reveal that the deaf institutional adult recalls his first days at the school for the deaf in three categories: first, his misery at being taken away from home and family; second, his fear of the institution itself (his perception of it as a 'hospital' or 'nut-house'); and third, his amazement and pleasure at finding other deaf girls and boys like himself. Homesickness and fear disappear as he becomes a member of the newly discovered in-group.

"It is also here that many acquire for the first time a new means of visual communication, the language of signs, which becomes not only a special language of a subcultural group but serves as a means of identifying the deaf from the hearing. Although oral schools emphasize speechreading and speech, the plain fact is that the deaf as a group use the sign language among themselves. According to Best, 78.2 percent of the deaf used sign language and only one percent used speech alone (1943:203).

"In 1955, 78.6 percent of the schools for the deaf taught by means of the oral method; only 5.1 percent taught by some non-oral method; and 14.3 percent taught by the combined method. However, only 19 percent of the public schools and 24 percent of the private schools reported restrictions upon the use of communication methods outside of the classroom, which can only mean that the sign language was permitted in most of the schools using oral teaching methods (Annals, January 1956). A study of the sign language, how it is acquired and transmitted, the significance of its content, and so on, would throw considerable light upon the entire process of communication as well as indicate the thought processes of the deaf.

"Most deaf persons leave school at the end of the elementary school period, but an almost equal number leave before they have completed the work. In today's competitive market

this means that they bear an additional handicap besides deafness itself; lack of schooling is one reason why the deaf are largely found in the lower paid occupations. The deaf may therefore most frequently be found in the lower socio-economic classes, considering the prevalence of deafness among the children of the lower classes and the occupational categories they largely fill in adulthood (U.S. Office of Education, 1936).

"After the school years the deaf person tends to continue his group association with other deaf persons throughout life, through alumni associations, state societies of the deaf, religious and welfare organizations, churches for the deaf, and various fraternal orders. The deaf have organized their own newspapers and magazines, and they have established their own homes for the aged deaf. The extent of membership in formal organizations is not known, but it is known that the deaf will go to considerable extremes to seek each other out, that they prefer the company of the deaf to that of the hearing, and feel more at ease with other deaf persons (Pinter, Fusfeld, & Brunschwig 1937). [For demographic confirmation of this and other social structure of the deaf community, see Schein (1968) and Schein & Delk (1974).] Among the adult deaf, in-group feelings are strong and group loyalty is intense. The extent to which group solidarity might be expressed was indicated in the movement in the nineteenth century to establish a deaf-mute Utopia in the West; Congress was petitioned to set aside a state or territory for deaf-mutes only (Annals 12, 1858).

"Marriage patterns also indicate the tendency for the deaf to associate with each other. In the only extensive study of the marriages of the deaf, published in 1898, Fay found that 85.6 percent of the married deaf had married other deaf persons. One preliminary study of attitudes of deaf college students shows that only 5 percent would prefer to date a hearing person rather than a deaf person, and about the same proportion would prefer to marry a hearing person. About 65 percent have already made up their minds to marry a deaf person.

"Among the other factors enforcing the social isolation of the deaf from the hearing world is public opinion, as expressed in the attitudes of the hearing majority. These appear to be similar to the fear and hostility patterns that appear in other dominant-minority relations; there is the assumption of the inferiority of the deaf and the stereotype of the deaf as "dumb". There seems to be less public sympathy for the deaf

apparently because of the ignorance of the gravity of the handicap and because of its invisibility. The Social Science Research Council reported that the deaf were held more in contempt than the blind, the crippled, and the aged (Barker et al. 1953). The public is simply not aware that deafness may be the most severe socially of all handicaps.

"Thus the deaf, first isolated from normal social relations by the fact of physical handicap become segregated as a group through the operation of institutional patterns in the general culture. Admittedly little is known concerning the social condition of the deaf; few sociologists have been interested in the problems presented. The majority of research studies on the deaf have been made by psychologists, who have often reported contradictory findings with respect to the intelligence and achievements of the deaf (Meyerson 1955). Much of the confusion in these and other areas seems to result from a lack of attention to the social factors or variables involved in personality development and to a lack of recognition of the formation of a deaf subculture.

"The most recent experimental studies seem to indicate that the average deaf person is of normal intelligence (Hiskey 1956). The so-called differences between the deaf and the hearing are largely the result of differential social experience (Getz 1953).

"There is much to be explored in this entire area. Sociological research in this undeveloped field can contribute much to the understanding both of the individual problems of the deaf and of the social problems associated with acoustical impairment." (Lunde 1956)

A bilingual continuum. The simplest representation of possible [or ideal] communication behavior of American deaf persons would be a line with these extremities: at one end a completely normal American English interchange, the "listener" with perfect speechreading ability receiving all that the speaker with perfect articulation is saying. At the opposite end would be a completely visual exchange, the "speaker" and the "hearer" using only a system of gestures, facial expressions, and manual configurations as symbols. Of course, neither end is reached in actuality. Although a very few individuals can attain high proficiency at speechreading under perfect conditions and many develop excellent speech, most deaf persons reserve this mode for contact with hearing

persons. The purely visual communication with no admixture of English is rare, though it may be that the less formal education he has the nearer the individual's communication would approach the purely visual.

But here the linear representation breaks down. Besides these first two modes of communication, digital symbolization of the orthography of English is also available to the deaf. Therefore the non-oral communication of the typical American deaf person may be anything from "pure" English printed on the air, so to speak, to sign language with or without an admixture of English words or word-derived symbols. But again, the actually observed communication is a combination in all degrees of these two with or without vocal, whispered, or silent articulation as supplement or accompaniment.

In other parts of the English speaking world there are other ways that the manual alphabets and the signs are combined. In American Sign Language, as aforesaid, English words manually spelled are often treated much as if they were signs in a stretch of [signed] utterance, and some signs (fewer than one would expect) are made by a hand configuration that recalls the initial of an English word that is a translation of the sign. But here too there is regional and individual difference. The journal of the National Association of the Deaf, The Silent Worker [now The Deaf American], in a series of illustrated short pieces has been advocating a greater use of the initial-sign correspondence. In England a quite different manual alphabet is in use; one that requires both hands to form the letters, and thus one not so easily combined with signs.

However, the American sign language, ultimately deriving from the French, has been extended to a larger population more widely dispersed. It therefore has had a quite different development, not the least important factor of which is its relationship to "complete" manual spelling, speech, and speechreading.

Total communication behavior is what we would seek to know, but analysis and synthesis are necessary, and the present study is directed toward discovering the structure not of the whole communicative complex but of the sign language. The sign language, as the term is understood in this study, requires only a small, though radical, change in the definition of language as given by Trager (1958): "It is the cultural system that employs certain of —the visible actions of the face and hands— combines them into recurrent sequences, and arranges these sequences into systematic distribution in relation to each other and in reference to other cultural systems" (1958:3).

[The following chapters] will deal first with observed behavior corresponding with phonetic behavior in spoken languages. Then will follow the analysis of this behavior, and the analysis of the structure corresponding with the phonemic level. Next the morpheme list will be considered, then morphemic structure, and an account of the procedures now in use and contemplated for the analysis of the morphology and syntax.

Chereme (kériym, or CARE-eem) and allochér (æl-o-kèr) are proposed as names for the concepts corresponding with phoneme and allophone (The combining form, chér- 'handy', as old as Homeric Greek, has been preferred to the learned English combining chir- or cheir-). Other terms useful or necessary to avoid confusion or false analogy will be introduced at appropriate parts of the discussion. It seems well to take sign as equivalent to word when the frame of reference is the sign language. The precise relation of sign to morpheme will be considered in the appropriate section below.

As the invention of a symbol system for the transcription of a sign language has had to go hand in hand with the analysis of its structure, the symbology as well as nomenclature will be presented gradatim with the analysis. For convenient reference a summary of the symbols used for sign notation appears on page vi, at the end of Chapter 5 (p. 68), and inside back cover.

Responsibility and range of validity. The writer, after much consideration, has chosen to present this study over his name alone; but much of the work at all stages since the beginning has been done by two research assistants who might as easily have been co-authors. Carl Gustaf Croneberg and Dorothy Chiyoko Sueoka have analyzed and transcribed data, discussed the determination of the cheremes, and contributed ideas as well as time to the study to the point where it is difficult to determine authorship. In the detailed discussion of the data, however, the sign or notation, when appropriate, will be identified by the initials of the one responsible for its printed form (i.e. CGC, DCS, or WS).

The analysis and conclusions here presented are based upon two kinds of observation of signs: extensive—for us all contact with students, faculty, and visitors to Gallaudet College from every state, Canada, and eight or ten other nations; for CGC several years in a school for the deaf in Sweden and travel in Europe and nine years at Gallaudet as student and teacher; for DCS, school for the deaf and several years work with deaf

associates in Hawaii as well as four years of graduate and undergraduate work at Gallaudet; for WS brief formal instruction followed by four years of teaching and research at Gallaudet College; and intensive—for all three repeated study of some five thousand feet of film taken at normal and slow motion speeds of the signing of fourteen deaf and two hearing informants.

While no systematic attempt has been made so far to identify and classify dialects and idiolects of sign language, there is clear indication that such divisions of the language are real. We believe that the analysis to be presented is valid so far as it goes for all the sign language idiolects we have observed, and further that it and the notational system developed with the analysis can be used to describe gestural languages other than the sign language of the American deaf population. The present study is offered as a fairly complete statement of the first level of structure of American Sign Language. The morphology and semology, especially the syntax, of this sign language and its dialect structure are presently (February 1960) being studied by the writer and his associates under a two year grant from the National Science Foundation. Future plans include historical studies and comparisons with sign languages of other cultures.

Fig. 1
The AMERICAN
MANUAL ALPHABET

3 CHEROLOGY [PHONOLOGY]

Signing and fingerspelling. Sign language utterances contain often both signs and fingerspelled English words in varying proportions, but structural differences [and direct observation of the utterer's behavior] make it possible to separate the two. For the purposes of analyzing phonology the two must be kept separate. The units of the syntactical system are morphemes, but these morphemes come from two completely different systems of structure. The fingerspelled English word is a series of manual displays that stand in a one-to-one relationship with the letters of the English alphabet, but the word itself is a morpheme or combination of morphemes constructed from the English language by the use of rules within the grammar of English. Though the deaf person may never have heard a sound, such is the power of semiotic systems and the human mind, that this person may still have acquired the ability to use the written or fingerspelled word with as much symbolic force as any speaker of English can achieve. The sign, on the contrary, is a unit of the American Sign Language, constructed as are all its morphemes from the features of its own system by use of rules that it will be the purpose here to explain.

To the signer these two kinds of morphemes may be treated as equivalent (out of direct awareness), because they are freely interchangeable in an utterance; but as soon as their structure is examined, the manually presented English word and the signs are discovered to differ radically. The statement, "Yes, I know him" remains the same as a message whether each of the four words in its English version is signed or fingerspelled. Thus without any change in the word order, there can be sixteen different ways of signing it. Know can be spelled by making the configurations for k, n, o, and w; but KNOW is signed by touching the forehead with the slightly bent hand's fingertips. It is signed in isolation as just described (much as know is spoken in isolation: /^{3}nów^{1}#/ with a full intonation contour); but in sign language utterance the sign KNOW may get only a slight upward movement of the bent hand and the forehead not be touched at all.

The major structural difference between signed and fingerspelled morphemes gives the user the possibility of variation

within a communicative pattern. Fingerspelling is telegraphic in several senses of the word, but the signed KNOW may take on modifications that can vary the meaning of the sentence from 'Yes, I am acquainted with him' to 'Oh, sure; that's only what I would expect of him' — to give but two of many possibilities. The completely fingerspelled sentence has only the signer's facial expression to differentiate it from the same thing written on paper—at one remove from language, writing is a secondary symbol system,and fingerspelling one step further,a tertiary system for English transmission, not itself a sign language. The structure of a sign, however, permits considerable linguistic lattitude, even as does a spoken word, because the sign itself is not an isolate or an encoded form of writing the word but a construction made from elements that themselves admit of linguistic variation. [Much more information about the linguistic variation, termed "modulation", in signs can be gained from the research reported since 1976 by Bellugi, Pedersen, Newport, and Supalla; to give but one example, Supalla's research gives clearly distinguishable descriptions of the way that touching the forehead with the identically held hand can vary to signify 'know' and 'knowledge'.]

The letters of the English alphabet are represented in American fingerspelling by nineteen distinct hand configurations. Different attitudes or presentations of three of these nineteen add five more symbols for letters; and motion of two of the configurations provide for the last two. Thus there are three modes of symbolizing within the American manual alphabet. Nineteen letters are represented by unique configurations of the hand; the first sixteen are

a b c e f i l m o r s t v w x y .

The letters d, g, and q share a configuration variously oriented; as do another triplet, h, u, and n; and a pair, k and p. Two letters are symbolized by configuration plus motion: The hand for i draws j, and the index finger (d or g) draws z. Figure 1, on page 28, shows these alphabetical configurations in conventionalized drawings as the person to whom the spelling was addressed, and not the speller, would see them.

In fingerspelling the symbolization of letters is made by static show of a hand configuration, except for j and z; although in reading fingerspelling the movement the hand makes in its change from one configuration to another may be a salient feature of perception. Considering the hand alphabet only as a set

of mutually contrasting displays emphasizes the difference in configuration. In the spelling of words, motion becomes more important. One hand may need to contrast with itself as is the case when a doubled letter occurs. There are three ways of signalling a doubled letter. With j and z doubling is simply a matter of making the necessary movement twice. Hand configurations that involve opposed thumb or a grip are doubled by opening or relaxing the fingers and repeating the configuration. Other hand configurations are moved to the side with a slight shake to indicate the second token. [Other modifications in the presentation of fingerspelling letters and in fact a great deal of information about the special relationship between fingerspelled words of English and certain signs that derive from them can be obtained in Robbin Battison's Lexical Borrowing in American Sign Language (Linstok Press, 1978).]

Word endings are marked in fingerspelling by holding the terminal letter an almost imperceptibly longer time than the others. Word beginnings may be marked by a displacement of the hand from a previous position. These observations, however, may approach the realm of individual stylistic differences and should be so considered. [See Reich and Bick, in Sign Language Studies 14 (1977), 59-72, for a quantitative analysis of timing in expert fingerspelling.]

Below is a tabular summary of the contrastive system of the American manual alphabet:

Contrast by configuration	a	b	c	d	e	f	i	k	l	m	o	r	s	t	u	v	w	x	y
down direction				q				p							n				
side direction				g											h				
movement				z		j													

A great deal of the contrastive load is put on the differences in configuration so that the other two resources of the system, attitude or direction and motion, are very slightly used. So slight are some of the differentiating features that the system is less effective for communication over distance, to large groups of viewers, and in poor light than it is for face-to-face use. Nevertheless, it is workable, useful, almost indispensable, and in heavy use by the deaf; and what is more

it is an excellent means of communicating with and among deaf-blind persons. The writer, after two or three years of experience with using the manual alphabet, found that conversation using the manual alphabet with a deaf-blind man was not only feasible but amazingly rapid and easy—the latter holding his hand lightly against the front or back of the spelling hand. The relatively small use of motion and of attitude change proves an advantage not a limitation under these conditions.

The nature of fingerspelling, evanescent though the symbols are, is that of a graphemic system. As any grapheme may have allographic forms [for example, the script and print versions of 'S'], so the configurations of the manual alphabet actually observed in fingerspelling show variation in form. For example, the pictured e of the manual alphabet has all four fingernails touching the edge of the thumb, but frequently seen is an allograph in which only the first two fingers meet the thumb, the others being tightly folded into the palm. Other allographic differences are the result not only of individual preference but also of the conformation, flexibility, and muscle tone of the signer's fingers and hands. A difference between the appearance of men's and women's formation and articulation of the "letters" is noticed even by observers who are not familiar with the system, and this difference runs through all sign language activity. Subjectively viewed at least, it is a difference as great as that of timbre and pitch of men's and women's voices.

Manual numeration. Closely related to the manual alphabet and fingerspelling of the American deaf community is its system of manual numeration. There is less uniformity, more variation, in finger numbering than in fingerspelling, but a similar combination of configuration, attitude, and motion is characteristic of both. The first five cardinal numerals are often but not invariably made with the palm of the hand toward the signer, while the hands for 6 through 9 are made with the back of the hand toward the signer. [Carol Padden (personal communication) has recently pointed out that in her dialect, of the large Washington, D.C., deaf community, the hand inward variation is used for especially personal numbers, as when a parent gives children's ages.] Ten is signed by slightly oscillating or jerking the fist with the thumb uppermost. This system is strictly decimal, the tens symbol being

repeated, in full form or vestigially, through the second decade. Eleven through fifteen and sixteen through nineteen may show the same reversal of attitude as the first and second group of digits. Multiple digit numbers are signed by shaking the hand slightly forward at successive points on a line from left to right in front of the signer.

Table 1 on page 34 (prepared by CGC and DCS) shows many of the features of the manual numeration system. Other features of the system are described (also by CGC and DCS) in the following paragraphs.

Approximations by decades. The equivalents of the English "forties", in his "thirties", "doing seventy", etc. are signed by shaking the configuration for the decade (30 through 90) in small arcs from the wrist. A facial expression accompanying such signs also helps to indicate that the number intended is approximate.

Long numbers. In numbers over one hundred signs are made for the digits in the same order as in reading; e.g. 257,100 is signed TWO HUNDRED FIFTY-SEVEN THOUSAND ONE HUNDRED. There is no standard rule for signing long numbers; the requirements for clarity will dictate the practice. Where long numbers are not separated into groups, the common practice is to "read off" the number, moving the signing hand from signer's left to right. Short numbers, such as telephone numbers, registration numbers, etc., may be read off as above or may be separated into groups by the signer, without using signs for hundred, thousand, etc., as is the usual case in signing years; e.g. 1959 is signed NINETEEN FIFTY-NINE.

Ordinals. American Sign Language employs as visible ordinal system only a limited group of numbers (1 through 9 or 10): The fingers in configuration desired, tips toward viewer, make slight repeated twisting motions. There is also a second system, used to indicate position on a chart or list, such as a list of baseball league standings: with fingers in the configuration, palm toward signer, finger tips pointing left, the right hand moves to the right. For higher ordinals these two systems are not used, probably because movements in these systems, if added to the movements already part of numerals of more than one digit, would produce awkward combinations.

Number	Configuration (Fingers: tb, 1, 2, 3, 4)	Attitude	Motion
0	o of manual alphabet	edge of palm toward viewer	none
1	1 upraised	palm usually toward signer; this is the case with 1-19, except that, for emphasis or visibility, 6-9 and 16-19 may be signed with palm toward viewer	"
2	1, 2 upraised		"
3	tb, 1, 2 upraised		"
4	1, 2, 3, 4 upraised		"
5	tb, 1, 2, 3, 4 upraised		"
6	tb, 4 tip contact; 3, 2, 1 upraised, slightly relaxed	"	"
7	tb, 3 tip contact; 4, 2, 1 upraised	"	"
8	tb, 2 tip contact; 4, 3, 1 upraised	"	"
9	tb, 1 tip contact; 4, 3, 2 upraised	"	"
10	tb upraised from fist a*	back of thumb to signer	shake or twist to right
11	fist a, (1)** [see Motion]	palm usually toward signer	(1) snaps up from under thumb
12	fist a, (2) "	"	(2) snaps up from under thumb
13	fist a, (3) "	"	(3) snaps or opens from fist
	[DCS: (3) upraised		nod 1, 2 together]
14	fist a or s, (4) "	"	(4) snaps or opens from fist
	[DCS: (4) upraised		nod (4), tb in palm]
15	fist a or s, (5) "	"	(5) snaps or opens from fist
	[DCS: (5) upraised		nod (4), tb upraised]
16-19	a, appropriate unit digit	"	a changes rapidly into appropriate unit digit
20	relaxed L, closed L	palm toward viewer; this is usually the case from 20-99	L closes to pinch; may move slightly to right
21, 23-29	L and unit digit	"	L into unit digit; may move slightly to right
30	(3), closed (3)	"	(3) closes; may move slightly to right
22, 31-99	(first digit), (second digit)	"	(first digit) into (second digit); may move slightly to right
100	(1), c	edge of palm toward viewer	(1) into c
1000	palm of left hand; (1), m on right hand	left palm held out; palm of right hand toward signer	(1); then m tips touch palm of left hand
1,000,000	as above	as above	as above, then repeat m touch farther from wrist

*'Fist a' and 'fist s' refer to configurations of the manual alphabet; see Fig. 1.

**Figures in parentheses refer to configurations already described above.

Instead the ordinal is understood by context or indicated by the addition of a fingerspelled th (such spelling for the first three ordinals, st, nd, and rd is rarely used).

Fractions. For fractions the numerator is signed as shown in the table of numerals, the hand moved directly downward, and the denominator signed just below the first signing space. For decimal fractions, the decimal point is first indicated by a pecking forward movement with the closed x hand and the digits signed successively to the signer's right [The closed x hand, tips of thumb and index finger end to end, rest of hand closed, is becoming much better known because of work with young children acquiring sign language as "baby O"].

Money. There is a sign for 'dollar' in American Sign Language, but it is often omitted in contexts where amounts of money are specified. The amount from one to nine (dollars) is signed by rotating the forearm with the numeral configuration from prone to supine position (i.e. with an acute angle at the elbow, from palm away to palm toward signer). The specification 'cents' is spelled manually with a few exceptions: 1, 3, 4, 5, 10, and 25 cents (the latter three equal to 'nickel', 'dime', and 'quarter') are signed by first touching the right side of the forehead with the tip of the g hand and then signing the numeral in front of the forehead, the hand maintaining the same attitude (supinated, i.e. palm inward). One cent to five cents are also signed in a single movement by touching the forehead with the radial (thumb) edge of the hand in the numeral configuration.

This description of ordinal expression is not exhaustive. The following table of equivalents of the English ordinal and adjective second will show something of the possibilities:

Washington was second in the league.	Fingers 1,2, in horizontal V drawn left to right a short way.
What's my grade on the second test	Fingers 1,2, in vertical V make a quick supinating twist.
First the bell rang, second the door opened, then ...	Thumb, 1, make L, thumb vertical, index of other hand touches thumb 'first', index 'second'.

[A Suggested Feature Analysis of Manual Numeration Signs

No.	Thumb posit. initial	final	Finger extension	Hand attitude	Action Forearm	Hand	Finger
0	opp	opp	[fs 'o']	neu			
1	add	add	1				
2	add	add	12				
3	ext	ext	t12				
4	add	add	1234				
5	ext	ext	t1234				
6	(opp)	opp	123	pro			(pinch)
7	(opp)	opp	12 4	pro			(pinch)
8	(opp)	opp	1 34	pro			(pinch)
9	(opp)	opp	234	pro			(pinch)
10	ext	ext	t	neu	(osc)		
11	opp	add	1	n/p	sup		ext
12	opp	add	12	n/p	sup		ext
13	opp	ext	t12	n/p	sup		ext
14	opp	add	1234	n/p	sup	open	
15	opp	ext	t1234	n/p	sup	open	
16	(ext)	opp	123	neu	pro	open	pinch
17	(ext)	opp	12 4	neu	pro	open	pinch
18	(ext)	opp	1 34	neu	pro	open	pinch
19	(ext)	opp	234	neu	pro	open	pinch
20	ext	opp	t1	pro			pinch
21	ext	add	t1	pro			pinch
22	ext	add	t1→12	pro			add-ext
23	ext	ext	t12	pro			wiggle 2
24	ext	add	t1→1234	pro		open	add t
25	ext	ext	t1234	pro			wiggle t-234
30	ext	opp	t12	pro			t opp 23
40	add	opp	1234	pro		close	[fs 'o']

Legend: opp, opposed
add, adducted
ext, extended
fs, fingerspelled
neu, neutral rotation
pro, pronate(d)
sup, supinate(d)
osc, rapid, small p&s rotation]
t, thumb
1, index,
etc.
(), may occur

The English verb second in a parliamentary context is signed by moving forward the upright forearm, thumb and index finger upraised from the fist. This sign has an interesting antonym in American Sign Language: The same configuration swung back (even until the thumb touches the signer's chest or shoulder in some instances) signifies 'I'm next' or 'I want to follow you.'

Manual spelling and numbering as shown in this section operate in part by static presentation of visibly different configurations of the hand and fingers, also in part by motion. In general the static mode of manual symbolizing seems to be used to denote other symbols themselves fixed, as letters and numerals are; while the symbolization of relationships, such as the ideas expressed by the sense of second just discussed, tends to find expression in motion.

Essentials of a sign. In a sign language proper, the signs always have a component of motion. In fact the structure of signs is identical with that of the two exceptional symbolizations in the manual alphabet, j and z. The nature of the symbolization, that is, the relationship of the sign to what is signified, and the nature of the signified itself are radically different. The essential features of fingerspelled z are that the hand having a certain configuration makes a certain motion in a certain place. In the context of other alphabetical symbols, this action will symbolize simply the letter 'z'. But when the same configuration, in the same position, is moved in a way only slightly different if not identically, the whole display signifies not a letter but the idea expressed in English by the word where—if the context is not letters but sign language.

Thus the sign clearly is a morpheme, the smallest unit of a language to which meaning attaches. As the example just given shows, the significance rests not in the configuration, the position, or the movement, but in the unique composition of all three. The sign morpheme, however, unlike the morpheme or word of a spoken language, is seen as simultaneously not sequentially produced. Analysis of the sign morpheme then cannot be segmentation in time but must be aspectual. The aspects of a sign that appear to have the same order of importance and the same part in language structure as the segmental phonemes of speech are the aspects of configuration, place, and action.

Other features of sign language appear to operate with these three basic aspects (configuration or handshape, position or location, and motion or action) in some such way as do pitch, stress, and juncture with the segmental phonemes in a spoken language like English. One of the other features is clearly facial expression already mentioned above. It seems likely that behavior of the kind classified as kinesic when it accompanies speech (Trager 1958) may have a more central function in a signed language. The same activity that is kinesic with respect to spoken American English may be an integral part of the formation of the signs and phrases and sentences in American Sign Language. But analysis of these features presents many difficulties, and if the assumption of the writer and his research associates is correct, this analysis will be much more feasible after the analysis of the basic aspects of a sign morpheme.

[Time has confirmed the correctness of this surmise. Recent research has shown the great importance, both in sign formation (i.e. the denotation of a particular meaning in single signs) and in sign syntax (i.e. the particular meaning of similar but contrasting sentences) of non-manual behaviors in signing. See especially the work of Supalla and Newport and of Bellugi and Pedersen on modulations of individual signs, Liddell on the separation of compound and complex sentence structures by facial and head activity, as well as the work of Baker and Padden on eye movement, and functions of five channels of sign activity.]

Like consonant and vowel, the aspects position, configuration, and action may only be described in terms of contrast with each other. Position may be signalled by proximity of the active hand to a part of the signer's body; e.g. a fist moved at the chest, chin, and forehead makes not one but three distinct signs: SORRY, ICE-CREAM, SWEDEN. [Many American signers have stopped using the last of these signs, substituting the one Swedish deaf people themselves prefer, made by action of one hand on the wrist of the other.] But when the position marker is the non-moving or inactive hand, position is signalled by the configuration of that hand. For example, let the configuration of the active hand be the index hand, the g hand of fingerspelling. If the motion is brushing the index tip across the fingertips of the spread inactive hand, the sign so made is WHAT (To make the meaning 'what?' a particular

facial expression is essential.) But if the motion is brushing the index of the active hand across only the upraised little finger of the inactive hand, the sign is LAST (for some signers; others use the little finger extension on both hands). Here then configuration is a distinctive characteristic of both the moving and the marking hand, but it is serving as the aspect of configuration in the active hand and as the aspect of location in the inactive hand.

Similarly, the aspect of motion, or more generally action, may be observed to be only a change in hand configuration in some signs. But this change in handshape will still be action as determined by the formational rules of this signed language, because it has the same function structurally as does movement through space.

Three aspects of any sign. The aspects of the (submorphemic) structure of a sign need more convenient terms than position, configuration, and motion; and it will be as well to avoid the suggestion of mutual exclusivity that these words have in their ordinary senses. Tab, dez, and sig are shortened forms of the terms tabula, designator, and signation. Tabula, like the others is a latinate word meaning among other things, 'the place where something is written,' and so it has been used to name the aspect of position or location in sign structure. Designator means 'that which points out' and refers to the aspect of configuration. Signation stands for 'the action of making a sign' and so serves well enough for the name of the aspect of motion.

[The old practice of using Latin-derived terms for concepts found in new areas of investigation seems to have been misunderstood or actually confusing to sign language students since 1960. Besides the writer did not make clear enough the distinction between how any gestural sign is made (alphabetical, sign language, other) and how the signs of American Sign Language are made—to linguists, the distinction between phonetic and phonemic aspects. Here in simpler terminology is the joint definition of tab, dez, and sig:

TAB is where sign activity occurs (or what marks it there)
DEZ is what acts
SIG is the action

The dez as what acts is recognized both by its configuration and by its attitude (sometimes called orientation or direction). The sig as action or sign activity is recognized as significant motion in space, or as a change in configuration, or as a change in attitude; e.g. in the sign meaning 'in the future' hand and forearm move outward and forward from the signer; in the sign meaning 'lose' the hand in S-shape opens to 5-shape; in the sign meaning 'other' the hand changes attitude or orientation from almost full pronation (palm side down) to full supination. Note that in the second of these three examples it is not sufficient to specify that what acts is the hand forming an S; what acts in the sign LOSE is the S-hand, pronated, forearm near horizontal—only thus will the action of opening the hand to spread configuration (5) signify 'lose'.

[The original analysis, especially in these sections, presented dez, sig, and tab as aspects, that is as ways of looking at sign activity that is almost all simultaneously in vision. In analysis it is possible to focus attention on the aspect of the appearance of what acts, or to focus on the action itself, or to focus on where this occurs or what makes the place distinctive. To suppose that the three aspects are independent parameters is to mistake the nature of sign activity or to confuse it with the sequential way that segments of sound in speaking follow one another to build a morpheme or word. To separate such details as the angle of the elbow and the amount of rotation of the forearm into orientation and treat them as different essentially from such details as which fingers are extended is possible of course, by a similar aspectual analysis. Nevertheless, the initial analysis of a sign into what acts, action, and location is not refined but lost when it is supposed that configuration and orientation are other than more detailed description of what acts.]

Sign notation. The order of treating, and writing down in graphic symbols, sign aspects used in this study [and in the 1965 (rev. 1976) dictionary] is tab - dez - sig. This order corresponds to no sequence in sign phenomena; it is arbitrary; but it permits some economy in notation. Like the hundreds, tens, and units of decimal numeration, the tab, dez, and sig places permit the same symbol to have more than one meaning in the notation. When a hand is not acting but serving to mark where the action is, its shape and attitude may

be identical to the shape and attitude of a hand acting; thus a symbol for what acts used in the tab position—to the left of the dez position of the written notation—can be the same symbol, but will now identify the tab.

Sig symbols written in sig position indicate of course what the action is, but with a three-place notation convention the sig symbols used as subscript to configuration symbols conveniently indicate the attitude of what acts or of what serves to mark location. One significant action, for example, is the action of rotating the forearm in pronation. When this rotation is the action aspect of a sign, the symbol is written in the third place of the three place notation. But one often significant feature of the attitude of what acts or of what marks location is holding the hand and forearm rotated in pronation. Therefore the same symbol used as subscript to a tab or dez handshape symbol will mean of course that the tab or dez hand is held palm down (if the arm is horizontal), or palm outward (if the forearm is upright).

The TABS of ASL. Location in a number of signs is marked by the contact what acts makes with a part of the signer's body (i.e. dez touches tab). Likewise location may be marked by the nearness of the dez, without actual contact, to a body part. Forehead, temple, cheek, ear, eyebrow, eyes, nose, lips, teeth, chin, neck, shoulder, or trunk may be touched or approached by the dez in its sign activity. However, examination of many pairs of similar signs for minimal contrast reveals that some of these points on the signer's body are not distinctly different (not tab cheremes) but occur in complementary distribution (thus are allochers, just as the English phoneme /p/ has an allophone with a puff of air in pot and an allophone without the puff in spot). To take an example from American Sign Language: The index finger of the dez hand which looks like g or d of the manual alphabet brushes the tip of the nose (tab) in its action (sig) in the sign MOUSE. But when the sig is motion outward from near the same place, for instance in the sign SEE, the signer and the viewer of the sign tend to think of the place as the signer's eyes. However, no significant difference attaches to a contrast only between nose and eyes, these can be analyzed as allochers of one tab chereme, mid-face. Whether the nose or the eyes are used depends on the action and what acts—on the sig and dez of each sign.

Similar examination of minimal pairs of signs leads to the isolation of six tabs above the shoulders; these are with the symbols following:

The whole head or face ○

The upper face, brow, top of head ⌒

The mid-face region ⊔

The lower face, mouth, chin ∪

The side face, cheek, ear)

The neck ⫿

The signer's trunk also is the location for many signs, but large as this part of the body is relative to the face, it is not divided into smaller regions contrastively; i.e. cheremically. One or both hands as dez, what acts, may touch the top of one shoulder or both shoulders (as in signs RESPONSIBLE, ANGEL); yet both hands may be brought to the hips (in the ASL sign RUSSIA). These signs use the extreme upper and lower limits of the trunk, but the contrast is all in the dez and sig, and the whole distance separating the shoulders from the hips is not used to make significant contrasts. The symbol for the trunk tab is □.

[Siple (1978) has shown how the nature of human visual perception can account for this differential use of the body as locator of signs; in brief, signers look at each others faces so that fine detail can be seen clearly near the point of focus and less clearly farther away. Battison (1978) has generalized this and similar material into phonological rules or constraints that specify how the hands are used where.]

The non-active arm makes the tab for a number of signs. The upper arm is tab for ASL signs HOSPITAL, SCOTLAND, and COKE (or coca-cola). Upper arm tab has been given the symbol \ . Any place easily reached from just below the shoulder to just above the elbow may be used; both individual preference and complementary distribution may be seen in the variations of the exact location.

The arm from elbow outward to the hand is used in three contrasting ways as tab, not including uses of the non-active hand itself as marker of location. Thus the forearm marks three tabs: The upraised forearm, which presents the elbow and the ulnar edge of the arm to the viewer and to the easy access of what acts, has this symbol, ✓ . The back of the forearm becomes a convenient tabula for sign action when the forearm is rotated to turn the palmar side down; i.e. pronated. Thus the same symbol for sig action of pronating the forearm can be used for the forearm pronated and serving as tab; however, as sig the symbol is written in smaller size; as tab it is shown larger and in the left-hand, tab place in notation: ᴰ . The forearm turned over to present the inside of the wrist uppermost is likewise a result of the same muscular action that performs sig action, supination. Again the sig symbol for supinating rotation is written small and last in the three-part tab-dez-sig notation convention. The tab symbol for the inside of the forearm and wrist is ᵅ .

In all these arm tabs, the appearance of the hand at the end of the arm is not taken as significant by users of American Sign Language. The hand may be open or closed, tense or relaxed, depending on the signer's habit of signing, state of mind, or muscle tone. The tabs just described are marked by the part of the arm or by its attitude.

There are, however, other tabs in which the non-active hand itself is the location marking element, so that the configuration or handshape and the hand's attitude are the significant features. Here the difference between tab aspect and dez aspect is simply a difference in how each is used. The hand as what acts is dez; the hand as what marks the place or receives the action is tab. Any of the handshapes used as tab can be found also in use as dez, but not all dez handshapes are used as tabs. [In recent investigations, this statement too has been shown to come from natural phonological constraints to be found in the behavior of children learning and adults using the language; see Battison (1978).]

Manual TABS. When the location of sign action is marked but not by a place on the signer's body or arm, the marker is the hand configuration and attitude of the inactive hand. Any or all of the nineteen configurations used in fingerspelling might have become the handshapes of sign language, but in fact only sixteen have been found to be used

contrastively. The number of distinct configurations (allochers) that may be observed is limited only by the fineness of the differences the observer takes into account; the number of cheremes (significantly contrasting handshapes and their attitudes) is set by the way users of the language react to similarity and difference.

The fine-differentiating kind of analysis, analogous to phonetics in spoken languages, has never been attempted for a sign language. But it is quite obvious that the phenomena of American Sign Language could be thus treated were there any need for doing so. The visible phenomena of sign language need be no more limited in variety than the phonetic phenomena of speech. Indeed the findings of psychology indicate that the sense of sight can discriminate more differences than the sense of hearing. But the activity under study here is language, not vision, and the economy of effort noted in all cultural activity operates here. No spoken language makes use of all the vocal sounds that can be produced to construct its morphemes, and it seems very clear already that no signed language makes use of all the gestural activity that can be produced to construct its morphemes—though it must be remembered that analysis of signed languages is only beginning while vast amounts of data have been collected and fine techniques developed by phonetic study of spoken languages.

At this time and for the purpose of this study, an extensive description of the configurational data is not needed; for the operating principles of phonemic systems are well established: It is not the absolute value, the precise curvature or direction of a finger that determines a dez aspect, but the fact that each other dez aspect is one of a set of such aspects treated as unlike the others by all users of the language; and of course the same holds true for manual tab aspects.

This reasoning also makes clear that the configurational features of what acts or what hand marks location are parts of a primary symbol system [the phonology of American Sign Language] and hence are not the same things as the configurations of the manual alphabet although some of the handshapes of the two sets may be identical to the eye. What makes a handshape of the manual alphabet is either its difference as handshape from the other eighteen or its changed attitude or both. What makes a dez chereme of American Sign Language is both its handshape and attitude and its use to perform a sign action, sig, in a sign location, tab. If this non-congruence of ASL tab/dez handshapes with manual alphabet handshapes is kept in mind, letters can be used as symbols for the former.

DEZ / TAB A, Å handshapes. In the American manual alphabet a, s, and t are all represented by contrast in configuration, handshape difference alone. All use a closed hand, but for a the thumb is held pressed against the index-finger edge of the hand; for s the thumb is opposed and clasps the folded-in fingers; for t the thumb is protruded between the index and middle finger. In American Sign Language these handshape differences are not used for significant contrast. Instead the users of ASL contrast the closed, fist-like, hand with other handshapes. Hands looking like the a, s, and t hands of fingerspelling (but in attitudes and actions that can not be used for fingerspelling) may be observed if a signer's activity is closely observed. These handshapes will be found to pattern, however, in allocheric ways. For example, the tab and sig in the sign SORRY usually constrain the signer to use an s-hand—striking the forehead with the knuckle of the thumb can be painful—so that the sign STUPID is usually made with the closed hand in a configuration; and some signers use as dez the hand in the configuration for spelling 't' in the sign TRY. The closed-hand chereme, with its three alphabetic-like allochers, has been given the symbol A. It does contrast with the hand that has the thumb alone extended, given the symbol Å. It also may be written with a subscript if the specification of the particular form of it is needed; thus A_s or A_t.

/B/ & /5/ as tab or dez. The flat open hand is the next chereme to be considered here. The b-hand of fingerspelling is flat and open and has the thumb opposed; that is, folded into the palm. The B-hand of signing ASL does not necessarily keep the thumb in but can have it adducted, alongside the edge, and may be bent more than would be tolerated in fingerspelling. It may also allow the fingers to be slightly spread apart, but it does contrast with the spread or 5-hand, which is like the hand used to denote the numeral '5' but with a tension in the muscles that draws back all five digits as well as spreading them fully.

/C/ & /5̈/ hands. The curved hand chereme is allowed much more variation than the c-hand of fingerspelling. The allocheric forms it may take might be described as the shape the hand would assume in grasping balls of assorted sizes. Its thumb is usually opposite fingers, as in finger-

spelling 'c', but it does contrast in the system with what I am calling a "bent-5" in which the fingers are retracted and spread but have the tips curved in. The bent-5 does not have a completely different symbol, but is shown with a triple mark over, $\bar{\bar{5}}$. C-hand of ASL also contrasts with a bent form of B, which does not oppose the thumb but which does because of its attitude and the sig of its sign make tip contact with a body tab. Exemplified in KNOW, the flat hand or B-hand actually assumes a considerable curvature as the tips of its fingers touch the forehead.

/E/ as ASL chereme. The E-hand is used in relatively few signs, and might perhaps be treated as a tense, retracted allocher of 'C'; it is made, like the e-hand of fingerspelling, by closing the fingers and thumb against the palm; in one form the nails of the aligned fingers rest on the edge of the thumb; in another form a space separates thumb and fingers; in still another the first two fingers rest on the thumb and the other two fingers are curled into the palm. Its use in such frequently occurring signs on the Gallaudet College campus as those for 'Europe', 'streetcar', 'elevator', 'emperor', and the "name-sign" for President Leonard M. Elstad give it the status of a chereme at least in the Gallaudet dialect of the American Sign Language. It is not used as tab.

/F/ chereme. The F-hand, dez and tab chereme, is clear and easy of isolation, not because it shows any lack of variant forms, but because none of these resemble allochers of other cheremes—at least not to users of the language. The F-hand is made by tip contact of the thumb and index fingers, the other three fingers extended; or by placing the ball of the thumb on the edge of the curled index finger [an allocher seen in signing of older signers and indicative also of the change in fingerspelling forms; thumb over index is an older form for spelling 'f' now largely changed to the thumb-index circle].

/G/ chereme. The hand showing pointed index finger, as would be expected, is frequently used as tab and dez in ASL. The forms of this chereme may be close to the manual alphabet 'g' , index extended from tightly closed hand, or 'd', index extended and other fingers meeting thumb. In ASL it has a thumb-up allocher not to be confused with genuine 'L' (below). The symbol 'G' is used for the chereme.

/H/ as tab and dez. The index and second fingers extended side by side and touching from the clasped hand also make a distinctive configuration, which furnishes the manual alphabet three symbols, h, n, and u. But here the difference in the two systems is immediately apparent: In various attitudes, pointed, respectively, to the side, down, and upward, this hand configuration is read in fingerspelling as these three letters; but sign language uses action as well as configuration and attitude contrast, so that once the hand is free to move, this three-way distinction is lost. Three fingerspelling symbols become one dez configuration , which has meaning only in association with the tab and sig used with it, though it can assume various attitudes as well. The symbol 'H' is used for this chereme.

/I/ as tab and dez. The little finger extended from the closed hand makes a configuration not easily mistaken for another, although when the thumb is lax or separated it may look like the manual alphabet y, and some signers' formation of I-hand can be very close to the a of fingerspelling. This chereme symbolized 'I' is used in many frequently occurring signs as dez and in a few as tab. [Some signs of ASL in which I-hand is tab or dez have meanings that accord with the little finger's status as last or smallest; other signs show the influence of fingerspelled English on the signing community, by retaining the fingerspelling association of i-hand for such meanings as 'identify', 'individual', and 'isolated'. A full study of the processes by which fingerspelled words become signs of ASL will be found in Battison's Lexical Borrowing in American Sign Language (1978).]

/K/ as tab and dez. The configuration used for k in the manual alphabet actually resembles a Roman upper case K, but only if the signer uses the left hand and views the hand from the thumb side. With the hand retracted (bent down at the wrist) in pronation, this same configuration represents the letter 'p' in fingerspelling. As with the H-hand described above, the cheremic use of the configuration is quite unlike its alphabetic use. Pronated, supinated, or neutral, bent down or back at the wrist or straight, this configuration can take on many attitudes in signing and remain the chereme whose handshape is symbolized 'K'.

/L/ as tab and dez. The L-hand is formed by making a right angle with the thumb and index finger, the other fingers remaining closed. As a chereme of ASL it may have forms appearing almost identical with some allochers of G-hand. However, when L-hand is tab, the dez and sig used with it make clear that the essential features of 'L' are the angle between thumb and index finger and its digital duality; while the essence of the G-hand is its pointing and its singularity.

/M/ [O] as dez. The bent hand forms a dihedral angle at the knuckles, fingers forming one plane and back of hand the other. Made with three or four fingers, with thumb folded in or extended, this group of configurations clearly contrasts with the flat hand, /B/, and with the curved hand /C/. The allochers of the bent hand are all more or less similar to the various individual forms of making the manual alphabet m. [When A Dictionary of American Sign Language (1965) was in preparation only a few years after the above was written, the writer and his associates reconsidered the chereme or phoneme inventory of the language carefully. One reassignment made then was to give the bent hand the symbol 'O' instead of 'M', because at that time data available seemed to favor grouping in one chereme signing hands resembling both the fingerspelled m and fingerspelled o.]

/R/ as dez. The crossing of the index and second fingers extended makes a distinctive configuration. This represents 'r' in the American manual alphabet ('x' in the Swedish system of fingerspelling, CGC), and because it serves as dez in only a few signs, and those obviously related to its alphabetic use (e.g. READY, REASON, RIGHT) it is likely to be a fairly recent addition to the dez list. Its symbol is upper case 'R'.

/V/ as tab and dez. The v-hand of the manual alphabet is identical with the next configuration of American Sign Language. But while the sign VISIT is an obvious borrowing via fingerspelling, unlike /R/ this configuration /V/ occurs in a great many signs with no fingerspelled origins. It might be thought to represent the eyes or light rays in READ and SEE; its use seems quite arbitrary in MEAN, MISUNDER-

STAND; the intersection of the fingers of the V-hand may be the point of contact when its use is for tab marking; and its obviously dual nature is apparent when it is used as dez in DOUBLE or TWICE, and as tab in CHOICE.

/W/ as dez. The W-hand shows the extended spread index, second, and third fingers, with the thumb on the nail of the bent in little finger. There is some overlapping of allochers of this hand and the B-hand. Whether to assign the configuration made by the four spread fingers, the thumb folded across the palm, to /W/ or /B/ is a problem however only when one is viewing the overall chereme system. The distribution of allochers in an informant's sign idiolect is easy enough to determine. [Like other decisions made in 1960, this one tends to be over economical in assigning of allochers, variant forms, to a particular manual chereme. Since that time it has been usual for the writer as well as others to allow the handshape used in signing the numeral '4' chereme, or phoneme, status; hence /4/.]

/X/ as dez. The bent index finger raised hookwise from the fist is one of the allochers of the chereme /X/. Another frequently seen is formed by bringing up the tip of the thumb to meet the index finger tip in the same configuration. These two appear to be in free variation. There is another allocher in complementary distribution with them. When the sig involves a flicked or snapped opening of this dez, it has to be formed by momentarily trapping the thumb nail under the bent forefinger. [The closed allocher of X (with thumb and index finger tips touching) is identical with the handshape called "baby O" by later writers. This term, symbolized 'bO', has psycholinguistic as well as neurophysiological justification. Young children learning to sign substitute bO-hand for other handshapes they cannot yet form (McIntire 1977). The thumb and index finger are controlled by the radial nerve, but the last three fingers are under ulnar nerve control; thus bO is not only the infant approximation of O but also of F, as these two differ by only one muscular action: With the same pinching action of thumb and forefinger, the other fingers together are either curled in or extended. Here it should also be noted that another variation of the open X-hand uses two bent fingers but has been indicated in the Dictionary with the symbol 'V'.]

/Y/ as dez. The most commonly seen form of the Y-hand extends the thumb and little finger fully from the tightly closed hand, but the three middle fingers may also be loosely held or even barely bent. A very different looking allocher of /Y/ is formed when the spread hand (otherwise /5/) has the middle finger bent in from the knuckle. Two other formations are observed to be used as allochers of /Y/. The extension of the index finger as well as thumb and little finger gives one; often used as dez of the frequently occurring signs AIRPLANE and FLY (in an airplane), it is perhaps less used than the first-described form by Eastern U.S. signers. The last is a clasped-thumb hand with index and little finger extended and parallel (used as 'h' in some national manual alphabets). [Given cheremic status in the analysis made for the 1965 Dictionary, the former of these two hands is symbolized 'ɤ'. Some writers distinguish also the parallel-finger handshape as cheremic and write it as 'Ƴ'.]

/Ø/ tab. One most important tab remains to be considered. When no overt marking of location is made, when the significant action does not require what acts to move toward or away from or on any specific body part, when the dez is in a neutral, unmarked position in front of the signer's body, and when this position is the "natural" or comfortable place to hold and move that dez, then the tab is 'neutral' or 'zero'. The symbol used is /Ø/, but when the whole sign is written, the notation is simpler and clearer if the zero symbol is omitted.

Because what acts in forming a sign of a sign language is relatively free to move in three-dimensional space as well as to change attitude and configuration, the action aspect of sign phonology would present a bewildering maze of movement, were it not possible to apply to this part of the system the clearly formulated methods of structural linguistics. Operating for each user of the language, in the midst of a literally infinite variety of action, is the principle of significant contrast.

• Circular motion, for example, may be large or small, may lie in any plane that the signer's anatomical limitations permit, may be interrupted or complete; but none of these variations is called upon to carry the primary burden of significance. It is enough to note that what acts makes a circle. When a configuration of the non-active hand marks the location as tab, the dez may circle it as center, the plane of that circle being vertical and perpendicular to the frontal plane of the signer's body. Or index finger or some other point of dez hand may trace a circle on the tab hand's palm or on some other body part. When the tab is zero, the circling movement will be in a plane convenient to the dez configuration and attitude. But tab, dez, and sig are aspects of a single unit of behavior, not separate sequential units like the vowels and consonants of a spoken syllable. As well as saying that the tab serves as center of sig as circling action it may just as illuminating to say that the circle that the dez describes serves to locate the tab. Aspects are ways of looking at, or what appears because of different ways of looking at, something as a whole; and aspects of a sign language have no independent existence but are artifacts of a certain way of viewing what signers do.

Linear sig actions. Some of the other actions of signing behavior can be reduced to motion essentially vertical, horizontally side to side, and horizontally to and fro. The precision with which these general directions may coincide with the geometrical coordinates of three dimensional space is immaterial in signed language behavior. The sense of the direction can be important, and in some signs the opposite direction of sig motion is used to make pairs of antonyms; e.g. BORROW and LEND differ in sig only, their motion

being respectively toward the signer and away. But both senses of the linear direction may be used in the sig of signs, as in EXPLAIN in which the dez moves alternately out and in, in fact in this sign both hands constitute what acts and one is moving in while the other moves out.

Vertical sig, Lateral sig, To-fro sig. Each of the three linear directions of sig action requires a symbol, one for motion in one direction only, one for the opposite direction, and one for the combination of the two directions on the same general line. The symbols have been chosen to be as self-explanatory as possible when put on two-dimensional display; but those used for to-and-fro motion may be confusing unless one remembers that the 'T'-like symbol means motion toward the signer, inward; and so the inverted '⊥' indicates the opposite, motion away. In symbols:

^	*Motion upward*
v	*Motion downward*
N	*Up & down motion*
>	*Motion to signer's right*
<	*Motion to signer's left*
z	*Side to side motion*
T	*Motion toward signer*
⊥	*Motion away from signer*
I	*To & fro motion*

Rotation sigs. A similar three-way use of sense in the word's geometrical and analytical meaning is characteristic of the rotation sigs made by the muscles controlling the forearm. The action of supination (rotating the right forearm clockwise so that the palm is up if the arm is horizontal) is given the symbol of a lower case italic ^{a} . The opposite action, pronation, turns the hand "face", that is palm down, and has been given the same symbol turned face down: ^{ɒ} . The combination of both these rotating movements of the forearm produces oscillation or twisting rapidly changing from one direction to the other, symbolized $^{\omega}$.

The thirteen contrasting sig actions just described, which have been grouped into circular, vertical, lateral, and to and fro motion, constitute the grosser sig movements. They are made with the elbow or shoulder as fulcrum for muscle action. All of them may be, but need not be, made with what acts (dez) in zero tab. This is true also of two smaller movements and a pair of opposite minimal movement actions to be considered next.

ɔ With wrist as fulcrum the hand can be flexed or retroflexed; that is, the muscle action can pull the hand forward or back. The same symbol is used for both actions that bend the hand at the wrist, as the relatively small number of signs in which they occur as sigs have other clear indications of which way the bend is made.

ə A still smaller action can be performed inside the hand itself. Bending and straightening one or more fingers while the hand remains relatively motionless is given the general description "wiggle" and symbolized by a script e.

□ & # In many signs the significant action is not motion of what acts but the change of one handshape to another. Generally considered this change is an opening of the hand or a closing of the hand. The symbols adopted for these sigs are arbitrary, but it may help to remember them if one thinks of the sides of the box □ as open compared with the appearance of closed, #. Opening or closing of a hand are not sufficient directions to describe what actually the action of a sign is; therefore, when these sigs occur, the new handshape symbol will be written after them in brackets.

Sigs using interaction. All the sig actions so far described are actions that the dez of a sign can perform independent of the context of its tab. The following sigs, however, are made distinctive by what the dez does to, on, in, near, etc. some location marked by a body part or inactive hand. These sigs involve interaction of dez with tab, or in the case of a double dez (when both hands compose what acts), interaction of one active hand with the other. All but one of them can be considered convergent; the exception, separation sig, is divergent, in that the final

moment of the sign's duration is marked by the separation of what was together—either dez and tab or both hands as double dez moving apart. These interaction sigs are here presented in tabular form:

Symbol	Name	Description
x	approach	dez toward tab, or dez to dez
x	touch	dez on tab, or dez touches dez
x	link/grasp	dez with tab, or dez with dez
x	cross	dez over tab, or dez and dez
x	enter	dez into tab
x↓ x< x>	graze/rub	dez on tab, or dez on dez lower symbol shows direction/ kind of action made in contacting
+	separate	dez from tab, or dez from dez

[Additional specifications. In addition to the sig actions that have been presented here, several conventions in writing signs make use of symbols in the sig place. First is the symbol '⌀' for interchange of the two hands in a double dez sign; e.g. in zero tab, the C-hands clasp each other, usually with right hand on top; then the hands interchange. This sign, PEACE, is written, C C ⌀

Another double dez sign, EXPLAIN used above as an example of to-and-fro movement, also uses alternation; i.e. one hand in while the other is out, and is written, F F ~

In many signs, the sig action is repeated, and this repetition is shown in symbols by a single (for once repeated) or double dot (for rapid repetition more than once) after the sig symbol.]

5 MORPHOCHEREMICS (Alias morphophonemics, or How the aspect cheremes compose signs)

If every sign of American Sign Language were simply composed of a tab, a dez, and a sig, the morpheme list or vocabulary of the language could be easily computed by this formula:

$$n_{(tabs)} \times n_{(dez)} \times n_{(sigs)} = \text{number of morphemes}$$

However, there are several different patterns of sign formation besides this, not to mention compound signs and contractions; and ASL in true linguistic fashion allows certain combinations of its elements and not others. Moreover the significant action in a sign is often made up of more than one of the sig actions described above. In short, the structure of morphemes in this language is not mathematically determined or mechanical, as in a one-for-one code like Morse code or fingerspelling, but is instead the result of the regular working of the kind of rules that are found in all languages. This level of language organization constitutes the morphocheremics, or morphophonemics of American Sign Language.

/Ø/ tab in ASL combinations. When the tab is zero the dez hand or hands may freely make any of the sigs except those involving interaction with a tab. These signs cannot be considered tab-less, however, because every sig is defined as the significant action of some dez,'what acts', at some significant location. The zero tab may be less precisely visually determined than others, but it is still a place, that space in front of a signer's body where the hand or both hands can freely and comfortably move.

Signs with body tabs. The tabs marked by parts of the body are more or less precisely defined, depending on whether the sig involves point contact by the dez or only action in the tab's vicinity (Some older informants, and a 1911 motion picture of a signed rendering of Lincoln's "Gettysburg Address" indicate that body tabs were never actually touched in formal signing. CGC). With body tabs any dez may be used, and the following single sigs are possible: circle, approach, touch, graze. Sig clusters are also found: circle followed by touch; touch and motion up, down, or away; touch

and wiggle; and touch and circle (rubbing). There are even some triple clusters; touch, rightward motion, and wiggle (as in DREAM); and touch, close, and upward motion (in BECAUSE). One or two apparent quadruple sig clusters are perhaps better analyzed as compound signs.

Style level shifts in ASL. Another most important morpho cheremic characteristic of the language may be an example of style shift. The practice of some signers, particularly those taken as paragons of usage by many, is to make the tab clearly visible in such a sign as SEE. Both by approaching mid-face tab (psychologically the eyes) closely, and by pausing perceptibly between this indication of the tab and the outward movement of the sig these signers achieve a classical, formal, or pure style of signing, which is much admired but not always followed by a younger generation of sign users. The informal or colloquial style of these latter signers, however, sometimes seems to indicate a structural more than a stylistic change. The writer would analyze the classical sign SEE as mid-face tab, V-hand dez, and approach sig (particulary when considering the public or platform style of signing), followed by outward movement sig; in symbols:

$$\sqcup \vee^{\times \perp}$$

The much more frequently occurring informal or perhaps newer formation of the sign is composed of zero tab, V-hand dez (in supination like the formal version), and outward sig:

$$\emptyset \vee_a{}^{\perp} \quad \textit{, or a high position of forearm;} \quad \emptyset \curlyvee_a{}^{\perp}$$

Apparently signs in very frequent use, sufficiently distinct in dez and sig from other signs, tend to shift from a body tab to zero tab. KNOW, to take another example, is formally or in older signers' idiolects, upper face tab, flat hand dez, and touch sig, but a form often seen is, flat hand dez, upward movement sig, in zero tab; respectively,

Older form $\frown B^{\times}$ *Current form* $\emptyset B^{\wedge}$

[It is particularly interesting to see how the work fifteen years and more later of Frishberg, Woodward et al., and Battison in historical linguistics of sign languages has confirmed this observation of style and diachronic variation.]

Morphocheremic refinements in ASL phonology.

When the configuration of one hand marks the tab and the identical configuration or a different one appears on the active hand as dez, the sig of a sign will be one of those involving interaction, or there will be a sig cluster with one of the interaction sigs followed by separation or accompanied by linear action.

At this point in the analysis the aspects of a sign, the tab, dez, and sig need to be and can be more precisely defined. These aspects—location, what acts, and its action—are but ways at looking analytically at something that is performed and perceived as a unit by signers. A sign is the basic unit of signed language just as the word is the basic unit of a spoken language. The original definitions of tab, dez, and sig permit such classifications of the structure of individual signs as that above; but when two hands are in use, there may be difficulty in deciding whether one hand is tab and the other dez or both hands are acting as double dez in zero tab. The area of this doubt can be narrowed by a decision to call one hand the tab when its motion is negligible compared to the action of the other hand, and to call the hands a double dez when they move in parallel, bilaterally symmetrical, or opposite actions. The tab/dez analysis seems more reasonable when the configurations of the hands differ. The double dez is indicated when both hands have the same configuration. But there is still room for difference in analysis. The sign SHOW, as some signers perform it, may be a double dez but assymetrical sign: The flat hand (B) and the index hand (G) are together directly in front of the signer's breastbone (i.e. centrally) to form what acts in zero tab and then move forward together (motion away as sig). But other signers hold up the B, palm outward, forearm near vertical and well on its own side of the body as tab, use the tip of the G-hand as dez, and touch its tip into the tab palm as sig (at which point the whole sign may remain so, or the tab hand may push it forward). Two alternate modes of signing this vocabulary item of ASL call for two different ways of noting the sign's components:

Double dez: $\emptyset\, B_{\mathrm{D}} G^{\perp}$ Tab / Dez: $\checkmark B_{\mathrm{a}}\ G^{\times\perp}$

When double dez is unmistakable, that is, when both hands have the same configuration and the same or opposite attitudes, their action may be identical or reciprocal. If the latter, a morphocheremic symbol (not a cheremic, sig symbol) is used to show that the hands alternate in action. To exemplify: the F-hands held about six inches apart (neutral rotation and forearms toward horizontal) may be moved downward:

ASL: ∅ FF^{v} English: 'decide'

Or, the same double dez may be moved alternately up and down:

ASL: ∅ FF^{N} English: 'deliberate', 'judge'

Or, the same double dez may be moved alternately out and in:

ASL: ∅ FF^{I} English: 'explain'

The double dez hands may operate first as if they were tab and dez, with an interagent sig, then move in unison. Such a sign is SHOW in the first example on the previous page, or the sign HABIT. In the latter the tab is zero, double dez is fist or A-hand, first sig is cross, second sig moves the whole active unit of hands, wrists, forearms downward:

ASL: ∅ $A_{D}A_{D}^{tv}$ 'habit'; also ASL: $A_{D}A_{D}^{x}$ 'slavery'

[In the 1965 dictionary, this kind of sign was differently analyzed: dez (what acts) was described as the A-hands crossed: and the sig simply downward, for 'habit', and, side to side for 'slavery'.] Some signers make the sign SLAVERY with the insides of the wrists in contact (i.e. left hand-forearm in supination, right, superior hand-forearm in pronation); this variant of the sign could be written,

∅ $A_{a}A_{D}^{tx}$ [or in later convention, $A_{a}^{t}A_{D}^{x}$].

[For a treatment of psychophysical and linguistic processes operating in this area of sign formation, see Battison's discussion of the Dominance Condition and the Symmetry Condition in Lexical Borrowing in American Sign Language, Chapter One.]

Right hand vs. left hand in ASL. The common structuring of many kinds of behavior by left-right opposition is completely superseded in American Sign Language by the tab-dez and other contrasts. Generally a right handed person will use the right hand for dez, and the left for tab when a manual tab is required; but this may be reversed at will. Fatigue, visibility determined by positions of signer and viewer and light source, and as yet undiscovered factors may occasion the right handed signer's use of left hand as dez. Since, however, there is no morphocheremic significance attached to right handedness, some signers utilize the right-left opposition for rhetorical purposes. The allocation of right and left hand as what acts to two actors in a signed anecdote, for instance, may be most effective, not only for the separation that English pronouns cannot easily accomplish but also more graphically. One may imagine the right hand dez as one person of tne story and its sig as action that person performs. If the sign is HIT, the left hand as tab may be imagined momentarily to symbolize the other person as object, suffering the action. The action of the right fist in striking the left palm thus gains graphic physical force and effect in addition to its arbitrary linguistic denotation.

In the writing system used in this analysis the dez symbol will be read as right hand, and the tab if it is a hand configuration, will be the left hand. In transcribing signs as they are observed, a reversal of hands for tab and dez that seems important to note will be indicated thus: $_{y}\,A^{a}$ —for 'other' done with the left hand as what acts instead of the right.

Historical change in signs. Just as body tab signs in frequent use may become zero tab signs, so two-hand signs in very frequent use may become one-handed. Double dez becomes single dez in zero tab in such cases. Three such signs exemplify three different processes of change. In ASL, WHAT? is made with a manual tab; WHY? with a body tab; and HOW? in zero tab with double dez. But in colloquial use they may appear differently, the first with zero tab, the second also with zero tab instead of forehead, the third one-handed. Formal and colloquial forms are shown on the next page in notation accordingly.

	Formal (earlier)	Colloquial (later)
WHAT?		
WHY?		or
HOW?		

The one hand forms of signs of which HOW? and WHAT? are representative examples may be selected for other reasons than those that determine whether a situation is formal or not. One of the signer's hands may be occupied in a way that has nothing to do with the act of communication, except that it will be apparent to both parties that two-handed signing is impossible or inconvenient, so that it may happen that the signer's other hand will be extended beyond the zero tab space even to the limits of interpersonal distance and there as an index be admonishing or fixing the person being questioned, or by grasping a lapel, wrist, or arm be imploring or exhorting; that is, one hand may be paralinguistic or kinesically used (with regard to sign language proper) while the other makes the strictly linguistic symbol.

Also the signer may have a rhetorical use for the inactive hand. The left hand (of a right-handed signer) may hold a dez handshape used in a sign for naming a person, while the right hand alone "says something" perhaps about what another person did to the first. Some of the signs in this recital will be one-handed anyway and some will have body tabs. In this context, a sign or two that should have had a manual tab or a double dez will be understood perfectly even though the left hand is still marking an element in the previous part of the discourse and not participating as it normally would in such signs.

There is still another factor to be considered in the occurrence of one-handed signs that were formerly, or are formally, made with two hands. Economy of effort as a principle of language change will always be checked by the need for ready intelligibility. As was noted above in connection with shift from a body tab to zero tab, the dez and sig may be sufficient to distinguish a sign from any others somewhat like it; but it is quite possible that signers without being aware of doing so tend to drop some of the distinguishing features of a sign when its context alone, or its syntactic

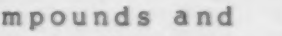
function, would suffice or almost suffice to determine it. This is not simply the counterpart of the "'*** **** **', said I" of Tristram Shandy, although both cases use visible symbols to stand for what the addressee can easily supply from language knowledge; but it has the features of the normal processes by which languages come to tolerate numbers of homonyms derived from words that were formerly distinct.

Evidence of sign changes. Although the typical signer may, like the speaker of any language, appear to be quite conservative about neologisims, There is evidence of rapid and widespread change in the two hundred years since the sign language behavior of the deaf was recognized, used in teaching, and partially recorded. The difference between the methodical signs in Sicard's Théorie (1808) and the signs now in use in the United States is large, but still apparently evolutionary. [The research of Woodward is particularly interesting on this point, and it tends to show that while French signs indeed entered the U.S. deaf community in 1817, they were added to and did not displace signs that must have already been in use among the deaf at that time.] Even in the relatively small amount of sign data observed in this study there is evidence of structural change. This is nowhere more apparent than in the linguistic community's treatment of signs that may be termed compounds and contractions.

The principle of the methodical or consciously invented sign, as noted above (page 10), is multiple signalling of the structural and semantic information in a word of French—later of English. A base sign for the lexical meaning, the semantic core, would be followed by signals, also made by manual activity, for designating the part of speech, number, gender, degree, tense, etc. Detailed historical studies are so far only in the planning stage, but it seems reasonable to suppose that the methodical signs underwent considerable change as they moved from the textbook and systematic Institute course in French grammar into the colloquial language of the deaf. There are many signs now in use that show this kind of origin, and presumably many more not obviously so derived will be found to have come from the same source. A direct link between the French methodical signs and the signs used in the United States is the preservation in manuals by Long, Higgins, and others of traditional etymologies. Also American Sign Language

has or had until very recently a large toleration for compound or complex signs—which all the methodical signs had to be.

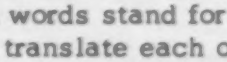
Compounds and contractions. As described and illustrated in the [older word-to-sign] manuals, to sign the meaning 'brother' one uses two signs together in order: MAN:LIKE.

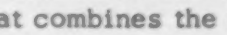


(In the second element the index fingers touch along their radial edges as subscript and "'" show.)

[In a convention adopted since first publication upper case English words stand for signs that translate or are commonly held to translate each other; hyphenated words stand for one sign that combines the meaning of the joined English words.]

In the same way 'son' is signed, according to the same sources, as MAN:BABY; the meaning 'father' comes from compounded signs for 'man' and 'generation/before'; and the meaning 'lady' comes from WOMAN plus POLITE—here in notational symbols:

Son 

Father 

Lady

All these signs, made according to early pictures or descriptions, are true compounds in the terminology of this paper. Each one is not only treated syntactically as a single sign but is often accompanied in simultaneous utterance by speaking the single English word equivalent in meaning. Although each element of the compound is complete, with tab, dez, and sig of its own, the elements form a syntactic and semantic unit. But these are "classical" signs, their forms defined, their folk etymology recorded, and their meanings being translated in one or more published manuals. In colloquial use [and over time] they have changed. The first of the examples, 'brother', seems to be least changed, because the tab of the second sign, LIKE, is often apparent while the dez for the first element is at the head level. [But because of passage of time or perhaps better observation, current researchers are reporting frequent occurrence of a thoroughly changed form

of the sign; this has G-hand as dez throughout and a double tab and sig; that is, the dez first touches the forehead tab (with fingertip) then makes ulnar to radial contact with the other hand as second tab; moreover, the final sign no longer equates in form with LIKE (index fingers aligned and pointing away but with RIGHT (dez hand striking down on tab hand, both in neutral rotation so that the contact is the little finger edge of the dez with the thumb-forefinger edge of the tab. For detailed linguistic description of this kind of change in sign phonology and morphology, see Battison, Frishberg, Woodward.]

The sign for 'father' is still more changed in contraction. Its tab is still upper face or brow, but the dez is the spread hand, '5', or a loosely held Å-hand opening to 5-hand. The sig is then either touch alone or simultaneous touch and open—in both cases any contact made is with the thumb, not the radial edge, of the dez hand. The same compound structure and contracted form is seen in the sign MOTHER. [In recent years the writer has seen far more of the 5-hand dez, simple touch sig than the A-hand touching and opening for these two signs; but whether diachronic change or synchronic variation are involved or both is discussed by the writers referred to above.] As an exercise in the reading of notation, here are several of the signs written in both early (or documented) appearances and presently encountered forms:

	Early	Current
Father	$\cap 5_{\mathrm{D}}^{\#}{}_{\perp}$ II $\checkmark B_{\mathrm{a}} \checkmark B_{\mathrm{a}}{}^{<}_{\vee}$	$\cap 5^{\times}$ *or* $\cap 5^{\mathrm{a}}$
Mother	$\}\dot{A}^{\perp}_{\times}$ II $\checkmark B_{\mathrm{a}} B_{\mathrm{a}}{}^{<}_{\vee}$	$\cup 5^{\times}$ *or* $\cup 5^{\mathrm{a}}$
Son	$\cap 5_{\mathrm{D}}^{\#}{}_{\perp}$ II $\bar{B}_{\mathrm{a}} B_{\mathrm{a}}{}^{\times}$	$\cap A^{\vee}_{\square \mathrm{a}}$
Daughter	$\}\dot{A}^{\perp}_{\times}$ II $\bar{B}_{\mathrm{a}} B_{\mathrm{a}}{}^{\times}$	$\}A^{\vee}_{\square \mathrm{a}}$
Brother	$\cap 5_{\mathrm{D}}^{\#}{}_{\perp}$ II $G_{\mathrm{D}} G_{\mathrm{D}}{}^{\times}$	$\bar{G}_{\perp} \checkmark G_{\perp}{}^{\vee\times}$
Sister	$\}\dot{A}^{\perp}_{\times}$ II $G_{\mathrm{D}} G_{\mathrm{D}}{}^{\times}$	$(\}A^{\vee}_{\times}) \bar{G}_{\perp} G_{\perp}{}^{\times}$

Another contraction is the colloquial form for 'lady', which incidentally seems to have the same kind of distribution with 'woman' in class dialects as do the two words in English. The sign for 'lady' as it is usually seen is written in notation

$$\square\,/5^{\vee x}$$

the thumb of the spread hand dez passing near or brushing the chin as it moves downward to touch the chest centrally. Here we have a different kind of sign from the contractions just considered. In SON, colloquial, the sigs of the contraction combine parts of the sigs of both elements, while the tab and dez are retained from the first element. In 'father' and 'mother' the dez is either from the second element of the compound, the spread hand (generation-ago), or from the first element of all female person signs, the thumb-up Å-hand. The tab in these two signs for parents contracted is retained or slightly but significantly changed—the chin instead of the cheek is tab in the shortened or newer sign MOTHER. In LADY, however, there are actually two tabs. While some signers may make the sign so as to miss grazing the chin with the thumb, the tab is still there for the user of the language; and this sign with its downward motion from the face region will still contrast with the sign meaning 'fine' or 'formal' or 'polite', in which the 5-hand moves directly, often from below, to its point of contact on the breastbone.

Another example of compound contraction will illustrate the morphocheremic change that the Y-dez may undergo. The sign for denoting the color yellow is the same in formal and colloquial signing. The spread little finger and thumb hand is given a twisting shake in zero tab: Y^{ω}. The sign GOLD, for which the traditional etymology is 'earring-yellow', is formally a pinch of the ear lobe followed by the sign YELLOW:

$$\}F^{\pi}\,||\,\emptyset\,Y^{\omega}$$

This sign also has the metonymic meaning 'California', and the most frequently observed form of it is a contraction in which the Y chereme has a configuration quite unlike manual 'y' in appearance. In colloquial use, CALIFORNIA is signed with a continuous sig motion, beginning with the touching of the earlobe with the tip of the bent middle finger as the 8-hand moves away from the signer with a twisting forearm motion; $\}8^{\perp\omega}$

The dez is able to make the contact because it is in the allocheric form of "open-8", which easily becomes Y if the other two fingers between thumb and little finger bend in, or becomes 5 if the middle finger extends.

Color signs, like YELLOW above, have been made by using an initial hand alphabet symbol and shaking or twisting it well before it was the English color word that served as source of the initial. Pelissier (1856) shows these translations from French to French Sign Language (FSL):

French	FSL		English	ASL
vert	V^{w}	:	green	G^{w}
jaune	I^{w}	:	yellow	Y^{w}
rouge	◡G$^{x}_{v}$	:	red	◡G$^{x}_{v}$
noir	◠B$^{x}_{>}$	:	black	◠G$^{x}_{>}$
brun	❳B$^{\bullet}_{x}$	:	brown	❳B$^{\bullet}_{x}$

Three kinds of color signs are included: (1) initial dez signs derived by one process used in coining signes méthodiques since Épée by using a manual alphabet initial for a word from a language foreign to the signed language; but these split (1a) into those like brown, or blue (not shown above), for which the French and English words have the same initial letter, and those like green and yellow, in which the change from French to English spelling requires a different initial dez; (1b). And (2) color signs like those for red and black, which in FSL as in ASL are genuine signs; i.e. possessing an arbitrary dez, a sig other than that made by shaking a manual letter, and a body tab. [The extensive research on color terminology in many languages and cultures begun by Berlin and Kay is pertinent to this part of sign language vocabulary; specifically the kind of social and cultural implications that may inhere in the extent of the culture's list of simple color words is borne out in social history of the French signing community (unpublished research of the writer).]

Native and foreign signs. The choice to treat compounding and contraction of compounds as the operative processes in present sign derivation has to some extent ruled out treatment of such partials as the touched or grazed face (as in LADY) as prefix morphemes with the sense in one set of examples of 'female' and in another of 'male'. In justification for this decision is that what happens to cheremes in well-authenticated compounds is too various to lend credence to a base-affix analysis, nor are there enough other indications that the aspects of what acts, action, and location (alias dez, sig, and tab) are used to compose base morphemes and affix morphemes. [The work of associates of Bellugi already referred to, especially Supalla and Newport and Pedersen and Liddell, as well as study of non-manual activities by Baker and Padden of the Linguistics Research Laboratory, makes it clear that there is indeed something akin to base and affix structure. This however is so different in nature owing to the difference between signing and speaking that the term the first of the recent researchers use seems to fit better: sign-modulation. The signs, much as herein described form bases, and the modulations are different manners of performing the significant action, changes in direction, force (see also Fischer & Gough) as well as changes in non-manual behavior. These phenomena are increasingly being found to be regularly related to the formation of the sign and modulations, to the syntactical and morphological (e.g. noun vs. verb), and to the sense of what is being signed.]

More on the initial-dez signs. The use of a hand configuration for the initial letter of the word that most often translates a sign is a clear indication of a borrowing by the sign language from another language, but it cannot be taken as an indication of date. As noted in the discussion of color signs, the French sign lexicon recorded in nineteenth century dictionaries reveals many such borrowings, and if there is no change of letter (as in bleu to blue), an initialized American sign may have a French origin. Sometimes the change from a French to an English environment of the signing brought systematic revision (as in V to G for 'green'); but ASL signs may preserve a forgotten French borrowing. For example, some hold, and with fairly good documentary evidence, that SEARCH-FOR in ASL uses C-hand

dez because of methodical derivation from chercher, or that the ASL sign STUPID uses A-hand, not S-hand, because it originally stood for asine (It is also worth noting that use of the S-hand and a vigorous sig, which is common when the sign is used emphatically, gives the signer a nasty bump on the forehead with the thumb's angular knuckle).

The important points about this kind of sign formation as borrowing and open method of coinage are first, that it does not argue a simple subordination of sign language to a spoken language, as the hand alphabet is secondary to the alphabetic writing system; and second, that a sign formed by initialization may often be one of a group with related meanings and similar structure; e.g. cousin, nephew, uncle, aunt; or law, rule, and principle:

(a) dez: C $H_{\vee}$ $H_{\wedge}$ A *(b) dez:* L R P

Third, Although as old as Épée, this mode of sign formation is still a living principle by which words are added to the stock of ASL. Additions to the general lexicon of the language are not a complete indication of its very extensive use, as personal names and place names are thus made into signs that may be known only among members of a local group.

Initial dez signs, especially those in which the tab is zero, may be considered abbreviations of fingerspelled words. When they are being considered as units in a signed utterance such analysis will serve as well as cheremic analysis of the sign into its aspects. As has been remarked, the sign language sentence is about equally tolerant of fingerspelled words and signs proper. The difference in analysis is important, however, when the sign or word itself is being examined. The difference in movement—significant in signs, incidental in fingerspelled words—is enough to show a different order of structure. Signing and spelling are also distinguished by their treatment of space or position. Although fingerspelling may be said to occur in the region here called zero tab, only j and z are structurally like signs. And while some initial dez signs have zero as tab, others may have a tab marked by a body part or passive hand configuration. In other words, such initialized signs structure exactly as do signs proper. [This whole subject of signs and fingerspelled words and the phonological, morphological, and semantic restructuring that occurs, along with the sociolinguistic relations of signing communities to speaking communities, has been treated definitively by Battison in Lexical Borrowing in American Sign Language (1978).]

Manually produced signs *of American Sign Language are written, first with a* **tab** *symbol to show* **where** *the sign action occurs:*

- ∅ *in front of signer's body*
- ⌒ *face or head region*
- ⌒ *forehead or top of head*
- ⊔ *mid-face, nose, eyes*
- ∪ *chin, lower face*
-) *cheek, side of face, ear*
- ⊓ *neck, throat*
- [] *trunk (shoulders to hips)*
- \ *upper arm*
- / *forearm, elbow*
- Ω *back of hand, wrist*
- D *inside of wrist*

Next *with a* **dez** *symbol for the handshape, and attitude*, of* **what acts:**

- A *closed hand*
- À *thumb extended hand*
- B *flat hand*
- B̈ *bent hand*
- 5 *fully spread hand*
- C *curved hand*
- E *retracted hand*
- F *loop and 3/finger hand*
- G *index finger hand*
- H *double finger hand*
- I *little finger (pinkie) hand*
- K *'k' hand of fingerspelling*
- L *angle hand, thumb & index*
- 3 *thumb & 1st 2 fingers spread*
- M *similar to* B̈ *or* O
- R *2nd finger crosses index*
- V *'victory' hand, spread*
- W *3 fingers spread, thumb on pinkie*
- X *index finger bent*
- Y *'y' hand of fingerspelling*
- 8 *mid-finger in from spread hand*

Then *with one or more* **sig** *symbols to show the sign* **action:**

Motion

- ^ *up*
- v *down*
- N *up & down*
- > *rightward*
- < *leftward*
- z *side to side*
- T *toward signer*
- ⊥ *away from signer*
- X *to & fro*
- ⊕ *in a circle*

Internal (hand or finger)

- ∩ *bend*
- ≈ *wiggle*
- □ *open*
- ■ *close*

Interaction: hand w/ hand or body

- ⋉ *approach*
- × *touch*
- ⋈ *link or grasp*
- † *cross*
- ⊖ *enter*
- ÷ *separate*
- ∩ *interchange*
- ~ *alternate*

* **Subscripts** *show how* **dez** *(D) is held:*

- D_a *supine (palm up or back)*
- D_b *pronated (palm down or out)*
- D *forearm near vertical*
- $D_<$ *salient finger to left*

Diacritics *show detail of* **action:**

- ˆ *sharp upward motion*
- ×·· *repeated touching action*

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6 MORPHOLOGY

Once the outlines of the cheremic system have been established and the patterning of cheremes into signs has been explored, a way is open to morphology proper, including syntax. [Eighteen years later, I should rewrite this opening sentence as follows: Exploration of the phonology of American Sign Language enables us to describe more precisely the syntax and lexicon of this language.] Having described a sign's aspects, the investigator may go to strings of signs in natural utterances and look for recurrent patterns. One of the first discoveries in such investigation is that on the level of syntax other signals than the aspectual cheremes are operating [Emphasis added in revision]. The analogy with the superfixes and intonation patterns of English described by Trager and Smith (1951) is not necessarily exact, but there is a clear indication that here in sign language a different level of structure has been reached.

Non-manual signalling. A striking example of similarity with a significant difference is to be found in an extensive conversation (occupying several hundred frames of 16mm film taken at 48 frame per second speed). The two informants are discussing a trip they took the previous year. Their faces and bodily attitudes, though relaxed, show much interest and animation in recollecting various details of the experience. The general pattern of the conversation is that one signer recalls an episode and begins or concludes his narrative with the question 'Remember?' The other replies with the same sign REMEMBER, and goes on to relate something he connects with the episode, perhaps concluding also with 'remember'; and so back to the other for several such exchanges.

The form of the sign REMEMBER used by both signers in the film is not the formal or isolated citation form such as a teacher-informant might give—which is a compound rendering 'think' and 'seal':

$$\frown \dot{A}^{\times} \,||\, \dot{A}\,\dot{A}^{\times}$$

Instead the signers in the film use the colloquial form: $\dot{A}\,/\dot{A}^{\vee\times}$ (The tab is the passive hand in A configuration held in neutral rotation and near horizontally; the dez is thumb-extended $\dot{A}$

held with the forearm nearly vertical, as the prefixed elbow-forearm symbol shows in this notation; the sig begins as a downward movement and ends with the contact of dez thumb tip on the nail of the tab thumb—it is fairly obvious that in this form of production the vertical position of what acts and the downward swing preserve traces of the older compound sign's first element.)

Although both informants in the filmed conversation use this form of the sign, they use it in ways that visibly contrast; nor is the order of the sign with others in the utterance the determining factor. In terms of the analysis made by Trager and Smith (1951) of English structure, one of the two ways REMEMBER is signed is analogous to the English sentence

/ ^{2}Re ^{3}mem ber^{3} || /

and the other is analogous to the contrasting English sentence

/ ^{3}I ^{2}re ^{3}mem ber^{1} # /.

These render respectively the meanings 'Do you remember?' and 'I remember.' In the ASL conversation the affirmative answering form of the sign always comes at the beginning of a signer's utterance; but the question asking form of the sign may occur at the beginning or the end or both of a signer's utterance.

Differentiating these forms of the sign $\dot{A}\curlyvee\dot{A}^{\vee\times}$ is a kind of analysis that would be termed kinesic, if the behavior that distinguishes them accompanied speech; but here it must be accounted linguistic analysis, because the behavior operates to distinguish two morphemes identical in aspects yet syntactically and semantically in sharp contrast.

The sign REMEMBER is signed by both signers in the film the same way, and in manual activity there is no difference between the question form and the response form, but the portion of the utterance equivalent to 'Remember?' or the double bar terminated phonemic phrase above combines the manual sign with a distinctive "look". The signer looks directly at the person addressed and slightly opens his face, that is, his eyebrows raise as his chin lowers. There is also in some occurrences a slight jerk of the head backward.

That portion of an utterance, however, which equates with 'Yes, I remember;' or 'I remember' (the double cross terminated English intonation) accompanies the sign's manual

performance with a slight lowering of the eyes, or a tiny nod downward, or both these minute eye and head movements—which may even precede slightly the onset of the manual signing.

The slightness of these movements cannot be overemphasized. They are small and quickly done and stubbornly remained outside the writer's conscious observation until attention was focused on them by the problem of the two 'remembers'. Of kinesic behavior Birdwhistell (1952) notes that the time for signal and for response may be of the order of one-tenth of a second; and in conversation with the writer (1957) hazarded a guess that the deaf person, communicating entirely through vision, might actually signal and respond in this fashion with a speed and prolixity beyond the ability of the untrained hearing person.

The writer is aware that the deaf are sometimes popularly supposed or even seriously said [in the literature that is devoted to "helping" the deaf to act as hearing and usually reveals a subconscious dislike or fear of deafness] to exaggerate facial expression. Here is Tomkins trying to make status for the Indian sign language by disparaging the users of the sign language that may have supplied a large part of the other's lexicon: "The deaf use a great deal of facial contortion and grimace" (1958:8). This is not even as accurate an observation as that an Italian speaker might make—"The English use a great many consonant clusters and splutter." The latter statement contains a partial truth about the phonology of a language, but any truth the former contains is limited to observation of the style of utterance by atypical users of a language. Attempts to teach articulation to those who cannot hear speech have sometimes led to strange or contorted facial movements, but speech therapists of today are as careful to teach "normal" appearance as right pronunciation to their deaf pupils. The film data for this study as well as all the communicative behavior observed at Gallaudet College confirms the conclusion that the kinesic behavior of the educated deaf person in American culture is nowhere sharply separated from the cultural norms. Indeed the dramatic productions of the college (presented entirely in sign language with a spoken translation read in approximate synchronization for the non-deaf) have shown large audiences that the appearance made by signers is not only "normal" and pleasing but intensely and effectively dramatic, as might be expected when both dialogue and action are visibly expressed.

In the visual system of American Sign Language, facial and other non-manual activity need not all be employed on one level of language structure. The eye lowering and head dip that signify the response, not the question, use of REMEMBER are on the order of suprasegmental signals (i.e. pitch, stress, and juncture phenomena in English). But in one or two occurrences of the response use there is a smile visible for about the same time that the head dip and sign's sig occupy. This smile, which clearly indicates that the signer's memory is pleasant or enthusiastic, would seem to be paralinguistic with respect to the linguistic expression of the message. Its presence is not called for each time the sign itself is used as a response to a question, so that it has not the linguistic status of the head-eye dip; but its physical structure keeps it much closer to the visual linguistic activity of signing than smiling as kinesic activity is to speech. Considered by itself however, this level of visual behavior would seem to be very like kinesics in physiological composition and in meaning; besides it is perhaps the closest communicative link between deaf and hearing persons in the same or in different cultures.

This part of the communication of the deaf—that is, both the dip and the smile kind of activity—needs much more investigation, for it is the key to syntactic structure in a sign language. It is also perhaps a key to what earlier writers termed "the natural sign language". Thomas Hopkins Gallaudet writes of an experiment in this vein (Annals 1847). Without using his hands at all he "signed" a story to a class in the American School at Hartford. One may suppose that this successful communication is the close counterpart of the game that linguistically curious speakers may play by applying stress, pitch, and juncture to a continuous vocalization like a hum to carry on fairly intelligible conversations.

[The important task of investigating non-manual activity in the behavior of signers to find the exact roles it plays in phonology, morpheme structure, and the order and other choices in syntax, as well as lexical system, has been undertaken by Charlotte Baker, with Carol Padden, and their early findings are available. Baker is also, in her current research, using the Facial Action Coding System developed by Ekman and Friesen; this means, among other things, that instead of having to speak of "a questioning look" as the writer did in 1960, it will be possible to give precise definition to facial behavior in sign expression.]

Sign ordering in questions. Having found that some of this visible activity not made with the hands may have patterned syntactical uses, the writer looked back through much of the filmed data, and in retrospect recalled many unrecorded sign utterances he had observed. Many questions besides 'Remember?' were signed simply by using a questioning look along with a sign. Another way of asking a question also appears. It is formal and less frequent and consists of "making a question mark" by using the G-hand to draw a question mark in the air or to bend and straighten.

[Throughout American Sign Language, not just in signing a question mark, a circle sig made by the tip of the index finger may be replaced by a quick crooking and straightening of that finger; this is true also whether the circle is performed in the air or circles on or touches a tab as it concludes— with the crook-straighten, or wiggle, sig, the touch is made by the straightening finger.]

Use of the question mark sign permits an English question sentence order, and indeed that order and that sign are most often observed in simultaneous communication—the use of signs while speaking—especially in lectures or faculty meetings and such situations. [Using signs in English word order and concluding with a question mark sign suffices to signal a question when the one questioned is fully as competent in English as in ASL. Teachers who assume full competence in (signed) English in pupils may find their questions thus signed are unanswered—not because the pupils are ignorant but because they have not seen a question asked.]

ASL order in questions. Facially signalled questions that require more than a single manual sign will often have a sign order genuinely that of the language. For example an informant on one of the fims in the data for this study signs:

Translated word for sign, this is: 'Pontiac Ford (fingerspelled) better which?' That is in English: 'Which do you like better, Pontiac or Ford?' Or perhaps: 'Which is better, Pontiac or Ford?'

Examination of patterning in the occurrence of the head-eye dip shows that it not only marks a response, as in the 'remember' use, but also serves as a much more common way to signal first person singular as the subject of a sign verb than does the sign translated 'I'. [Reference to first person in ASL is made with the G-hand pointing in or making contact at the breastbone; the I-hand upright moved toward signer is used by interpreters rendering spoken English simultaneously and occasionally by deaf signers in a kind of hypercorrect style of signing English sentences. See also Friedman (1975) and Stokoe (1972:69-71).]. For example, a student to whom the figurative use of the word backlog was being explained suddenly interrupted the explanation and in a split second produced just these two manual signs:

Literally, 'have behind'; but the head-eye dip made as this manual activity began indicated that he was signing the sense of, 'I'm keeping something in reserve.' [This example also neatly illustrates a very prominent difference between English and ASL syntax: The former must have at least an indefinite or an unstressed pronoun as object of every transitive verb (e.g. have something or have it), but ASL lets the sign addressee supply the object or latently symbolizes it—since the hand that acts in the verb sign may often be taken as a token of what is acted upon.]

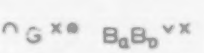
Even with only two non-manual signals, head-eye dipping and questioning look, it is possible to address three important questions. First, is such activity part of sign language itself or related to it in some such way as similar acts are to spoken languages? Second, in the former case, may the non-manual activity itself be a sign or substitute for a sign? Third, in case it can be an actual word-like unit of signing, what information does it give about sign language syntax?

Examples already given here [and especially the research referred to done at the Salk Institute and the Gallaudet Linguistic Research Laboratory] show that whatever uses it has to make the deaf signer appear a user of the kinesic systems of his or her culture, this activity is definitely linguistic rather than paralinguistic in many cases. When the

head-eye dip alone signals that the signer is subject of a verb that begins the utterance, this non-manual activity is clearly substituting for a manual sign that might in some circumstances be used instead of it. In such uses the head-eye dip also serves the investigator as a regular indication of a verb; that is, the sign that accompanies such non-manual action is in the absence of other indications the kind of verb that can take a person as agent or patient (subject).

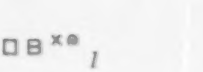
Headshake in signing. Another signal functioning on the syntactic level is the headshake. This action is for the deaf as well as hearing person in our culture sufficient to signal a negative answer to some questions. With other kinesic signals, it may indicate a range of replies from decisive refusal or denial to confidential assent. But this kinesic headshake is a grosser movement than the activity in a signed sentence that includes negation. So small is this non-kinesic, syntactical headshake that the writer and his associates scanning and transcribing a filmed sign conversation missed it until the self contradiction of an utterance without a negative sent us back to look at the non-manual behavior. It was found with the sign translated 'should'— the X-hand in pronation as what acts makes several small downward movements in neutral space (one sharp checked larger movement signals 'must'); but with this sign was a minute headshake, so of course the sense in the sentence has to be 'shouldn't'.

This headshake, symbolized with a subscript '3', is found to pattern with many of the same signs that the head-eye dip, subscript '1', serves as subject. With headshake they become negative first person singular subject-predicate structures. Examples follow:

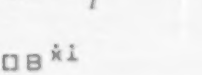


'I don't think it's a good idea.'

'I don't have it.' [The negative can also be incorporated into the manual sign; see Woodward.]



'I enjoyed (it).' (A signer asked if he liked a movie, replies.)



'I didn't enjoy (it).'

It will be noted that in the last example the sig of the sign ENJOY is not the same in the two appearances, the affirmative and the negative. This change from rubbing the heart region with a small circular motion to moving the hand sharply a little distance away from that region may be at base neurophysiological: Like patting the head while rubbing the stomach, headshake and circular manual action may be difficult for some persons to coordinate [though it would seem intuitively that head and hand moving muscles would be less subject to difficulty of control than opposite hand, opposite action combinations; it is more likely that the change in sig shows a trace of negative incorporation, even though a negative incorporating form *NOT-ENJOY is not attested]. Or the change may be to shorten sig duration so that the head shake will be seen. Or it may be more symbolic; just as the signs TO and FROM contrast directionally—

$$/G_a\ G_b{}^{\times} \qquad /G_a\ X^{+}$$

—so the sig of 'not-enjoy' may be an approximation of a directional opposite of the sig of 'enjoy', the rubbing action being opposed by the quick, checked retreat of the hand from the chest. [This last statement seems to anticipate the later discovered negative incorporating signs.]

Syntactic structure: research needed. The isolation and description of the sign language sentence as a syntactic unit await further study, but it seem likely at this point that the patterning of the aspectual, cheremic, elements of manual activity with the head and eye kind of supra-aspectual elements will furnish the clues to the syntactic structure. For instance, a kind of "terminal juncture" in signing is to be seen perhaps in a general relaxation at the end of an utterance of one kind. It may be taken as similar to the "dropping" of the voice, but the dropping of the hand or hands that acted in the final sign is more a feature of the general somatic change than it is a separate signal. Similarly, the utterance that is followed by a reply, which seeks perhaps an opinion on what has just been signed, ends with a kind of upward or outward "focus": eyes, face, hands may all join in passing the conversational ball to the other person in the signed conversation.

Much more remains to be done also in establishing exactly what are the structural principles of the sign language sentence, the overall pattern, and how dialect and idiolect patterns utilize one or another part of the total possible pattern. For it is apparent now that just as any speaker's variety and complexity of syntactical patterns will vary according to his age, intellectual habits, and education, to name a few factors, and the extent of his vocabulary will be similarly determined; so the sign language user will differ in employment of the resources of the language. But there is another way that signers may show difference in selection from the overall structural patterns. Presumably the signer's language habits will be more or less affected by the extent to which English is a second language. The bilingual person may only in an occasional slip of the tongue superimpose the patterns of one language on another, but two languages that can be used simultaneously may be more strongly drawn into syntactical conformity. [Even as this is being revised, the question to what degree sign language rules are observed in simultaneous signing and speaking is being investigated by Charlotte Baker and Dennis Cokely at Gallaudet College.]

Again, more study is needed. Some signers, members of the Gallaudet College faculty, whose signed sentences may often be translated into idiomatic English by word-for-sign change alone, say frankly that they sign "differently" in other situations. The difference may be analogous to a speaker's different ways of speaking with superiors, subordinates, family, children, intimate friends, strangers—but there is also the strong possibility that along with the usual stylistic differences there is a greater or less similarity to English syntax in these different situational levels of signing.

[Diglossia in a signed language. Pursuing this last idea, in 1969 I examined the possibility that in American Sign Language (or more properly in the community of its users, some third or half million persons), there is the situation Ferguson (1959) has labeled <u>diglossia</u>. That is, in a given language community two quite distinct varieties of one language may be regularly apportioned to different kinds of uses. It is possible to consider American Sign Language a continuum of varieties very gradually shading from one into another (Woodward 1974), with a variety of quite English-like signed sentences as

[evidence of a variety like the H or High variety in a diglossia being used for formal, public, and intercultural purposes. At the same time it is possible to find very un-Englishlike signing being used among deaf signers for the kind of situation that in a diglossia calls for the L or Low variety (Note that Ferguson in the original discussion of diglossia and careful scholars since have been at pains to point out that the terms H and L are not to be taken as moral judgments or as referring to any kind of rating of the varieties on linguistic excellence; in fact in all diglossia the phonology of the H language variety is a subset of the phonology of the L. Note here also that the term "Low verbal" often applied to deaf persons by professionals in special education is at best a gross misnomer and means only that the person so characterized has less than full competence in the English language— that person's competence in a signed language, which is just as verbal, nominal, phonological, syntactic, grammatical, and patterned as any, may be completely ignored by those who use the term).

[There are thus good reasons for considering the ASL situation in the light of the linguistic and sociological points that Ferguson (1959) has made; and James Woodward of the Linguistics Research Laboratory is engaged in such a study. But another fact in the situation of the sign language community must be considered as well. Deaf signers live in and participate in a larger culture with a spoken language not a signed language. Diglossia refers to differential use of two varieties of the same language, but ASL and English are different languages, and it is important to realize that the community whose language is ASL lives in a bilingual as well as a diglossic situation. To varying degrees deaf persons may sign varieties of language that are more or less like English in word order, vocabulary choice, presence of function words, etc.; but this does not at all guarantee that all signers will acquire English language competence by watching or imitating them. So far as any linguist knows, competence in a given language is attained by use when young, or study when older, of that particular language.

Whatever the individual signer's competence in the signed and the spoken languages—deaf signers are not automatically competent native signers if only because most of them did not have deaf signing parents—both bilingualism and diglossia are applicable to the sign language community

[at large. The most important implication of this double fact is that not one but two linguistic communities are involved. What looks like perfectly acceptable language behavior in one community may be met with entirely different reactions in the other. In particular I am anxious here to correct what may have been misleading in my 1969 treatment of sign language diglossia. That is, the assigning of High and Low varieties of signing to formal and informal situations and the characterization of the former as English-like and the latter as ASL-like was all done from the point of view of one segment of the spoken language community. It is true that in educational settings signing more like English in order and other respects is allocated to formal uses—a deaf colleague sensitive to these sociolinguistic issues has told me that even in small groups or individual conferences his native-signing students reacted negatively to his signing ASL instead of English sentence types. But it must be remembered that these conferences dealt with academic material and took place in a faculty member's office at a college. It is quite conceivable that if one were to take the point of view of the deaf community, and consider interactions that involved no hearing persons, a variety of signing that was not like English might well be perfectly appropriate for formal, in-group, uses.]

Conclusion. While the cheremic analysis of the sign language seems to be complete enough to make a number of observations about the formation and use of signs, the writer is aware that the period of the study is all too short to have arrived at a complete and exhaustive analysis. Other ways of analyzing cheremes are likely and possible; and judging by the length of the list of symbols, more may still be done to establish the true isolates or structure points of the language.

The other kinds of signals, such as the head dip or questioning look are only beginning to be analyzed, and a number of pre-linguistic, paralinguistic, and to coin still one more term, dualinguistic data remain to be considered. Nevertheless, the work so far accomplished seems to us to substantiate the claim that the communicative activity of persons using this language is truly linguistic and susceptible of microlinguistic analysis of the most rigorous kind. And the cheremic and morphocheremic analysis at its present

stage will make possible the preparation of a lexicon, now in progress, which can be more than an English-to-Sign word list. The lexicon will arrange entries according to the sign language aspects [tab, dez, and sig]and will give some indication of its morpheme class and function class, as well as etymologies based on structural and historical principles, with approximate translations into English glosses.

[This lexicon, A Dictionary of American Sign Language on Linguistic Principles, duly appeared, with National Science Foundation publication support, in 1965. It went out of print ten years later, and a revision was issued in 1974. The first edition of the dictionary was reviewed by Bornstein and Hamilton (1972), in comparison with a number of other national sign language dictionaries. It is still the only extant dictionary of a sign language based on a listing of the signs of the language by their formational units instead of a glossing of a word or meaning of some spoken language with a pictured or verbally described sign action.]

The analysis presented here seems to offer a sound basis, whatever its faults and inconsistencies, for further analysis and description of the structure of this unique, most useful, and linguistically interesting language. Perhaps it is not futile to hope that this work and what it will lead to may eventually make necessary the change of the definition of language in a recent edition of the Encyclopedia Britannica (by G.L.Trager), to read:

> "A language is a system of arbitrary ~~vocal~~ symbols by means of which persons in a culture carry on the total activity of that culture."

Important as are speech and hearing in human cultures, the symbol using capacity in man is anterior, as this symbol system of those who cannot hear demonstrates.

7 AFTERWORD [To the revision]

The system of forming morphemes in American Sign Language, which I termed "cheremic" in the original study, has with justice been called phonology since Battison's 1974 article in Sign Language Studies. Although many subsequent investigators have dealt with it, the analysis of ASL phonology cannot be called complete and definitive. One reason that a full descriptive grammar of ASL has not yet appeared is that in 1957, the year this original outline was begun, Noam Chomsky's Syntactic Structures was published. As a major watershed in language related sciences, it naturally affected the flow of linguistic activity; for two decades more linguists have seemed to argue about how to do linguistic analysis than actually to set about analyzing large bodies of data, or there has been more time spent in trying to determine the form that descriptive grammars should take than in writing them.

A more powerful reason we lack a definitive description of ASL actually puts a full description of any language out of reach—all grammars leak. One of the most carefully assembled abstract systems of knowledge, that of modern physics, cannot capture fully a natural system; no more can the best linguistic analysis of rigorous rules fully capture a natural living language.

Despite the uncertainty principle operating in linguistic as well as in physical science, it would seem that the better an attempt at describing a language may be, the more it should be able to help its readers to an understanding of that language. However readers of this revised work or of the original ought to be aware that it attempts to sketch an outline of the structure of ASL and not to describe the language fully. Its first stated purpose was to interest linguists in considering as a language a symbol system that had been neglected and for a long time denied any claim to be a language or even to have a grammar. The outline was and is not intended to serve as a handbook for those who wish to begin learning or to gain proficiency in using the language. Understanding something about how a language forms its words (from the common elements of human vocalization or gesticulation) and how it forms its sentences is quite different from being able to converse in the language.

Another caveat is needed here: The whole analysis as originally presented and here revised depends upon a full recognition of the difference between a sign and a word even though on another level of language signs and spoken words may act alike in syntactical arrangements and as carriers of language meanings. Analysis of morphemes in a spoken language requires recognition that speech sounds are produced and processed in sequence, one after the other. But morphemes in a signed language are made and perceived as unitary acts. To analyze them requires the recognition that what composes a sign morpheme must be different aspects of the same act.

These aspects appear only when a conscious analysis picks out different simultaneous components for special focus of attention. They are not physiologically or physicaiiy separate or separable. They cannot be performed in isolation and in different orders, as for example the segments /æ/, /k/, and /t/ of cat and tack. The aspects of a sign morpheme make sense only in terms of each other.

These aspects, originally called the dez, sig, and tab, have been discussed in this revision more generally as

what acts its action its action's location.

Naming them thus serves to emphasize their interrelatedness, but it does give the dez some priority and recognizes a partial autonomy. What acts can be formed and looked at without performing any action with it. Action however is inconceivable if nothing is acting except by an act of cognitive abstraction. Like the grin of the Cheshire cat when the cat had disappeared from Alice's sight, the action or sig of a sign without something to act and a place of action is imaginary only. The imagination or cognitive abstraction needed to consider what acts, its action, and where it acts in isolation is by the nature of things unlike the empirical observation that the mouth parts or speech organs must form the initial consonant of a syllable first, then change for production of the vowel, and then move again to form a final consonant.

When the composition of a sign language morpheme is seen to be the simultaneous aspects of one bodily act, it is then necessary either to consider these three aspects, or to abandon this view of the matter entirely and find some different rationale for analysis. To suppose as some linguists do that there are four parameters of a sign is to abandon a logical

position without having another to move to or even without realizing that the three aspects are postulated not observed.

If a sign is described as (1) a location, (2) a movement, (3) a handshape, and (4) a somehow described "orientation" of the handshape, it is necessary to specify whether the location is where the movement begins or where it ends or where it stays; it is also necessary with four parameters so described to specify whether the handshape begins its movement with the orientation specified, ends in that orientation, or keeps that orientation throughout the movement. Analysis, that is, may be either aspectual as here or made in real time; and of course the latter kind of analysis must go far deeper into as it were "phonetic" detail than does a three-aspect analysis. Such detailed analysis of the events occurring in the actual time of a sign's performance may be useful for some purposes, but the levels of linguistic analysis must not be indiscriminately confused. Thus it is one thing to say that the English word pet is composed of the phonemes /p/, /e/, and /t/ in sequence; quite another to say that it consists of a bilabial voiceless stop consonant, followed by a short mid-front vowel, followed by a checking and a quick release of the air stream forming the vowel by pressure of the tongue's tip on the upper alveolar ridge and an immediate release of the air passage restriction as the jaw displacement is reduced. If analysts choose to examine all the phonetic features of signing in a sign language—a task that entails looking microanalytically at each sign's lifetime of 50 to 300 milliseconds—they should certainly do so; but confusion and not clarification will follow if they do not distinguish at all times between visible phenomena and significant linguistic contrasts.

What makes one manual sign contrast with another is detail in any one or more of the three aspects of each: what acts, what it does, and where. Thus aspects although cognitive or analytical abstractions may be considered bundles of distinctive features. Handshape and attitude (miscalled orientation) are both ways in which what acts can vary and distinctive features of both result from differential muscle action, but they are not variable independently of one another, except in a few special circumstances. A standard example used to prove that orientation is distinctive uses the pair of signs SCHOOL and MONEY. The tab for both is the horizontally held supinated

forearm's B-hand. In both the sig is repeated patting action. What acts in SCHOOL is the dez hand in B configuration and forearm in pronation. What acts in MONEY is the dez hand in B configuration and forearm in supination. This contrast is sometimes described in the terms "palm upward orientation" and "palm downward orientation". These terms may be taken as synonyms of supination and pronation, but not orientation as on the same level with what acts, action, and location.

A third sign in this same minimally contrasting set is never considered in discussing orientation. STOPPING has the same tab and sig as the two signs being considered, but in this sign what acts is the dez hand in B configuration with the forearm neutral, that is rotated neither in pronation or supination. Because what acts has the flat hand configuration and is unrotated, its repeated patting action is made with the edge of the hand instead of its palm or back, and its palm direction (usually the first observation of the orientation) may be at an angle neither up, down, right, left, outward, or inward but oblique to all of these cardinal directions that must be used to define orientation.

A signer's hands can be turned to face their palms in the direction of any of the infinite radii of a sphere in space, but of course wrist, arm, upper arm, and shoulder action are entailed as observation of oriental dancers' movements show. It seems reasonable to believe that just as signers do not utilize all the possible movements of the hands and arms or even all those used in temple dances, so sign receivers do not read palm direction and angle as a kind of instant problem solving in solid geometry. Instead they appear to respond to <u>something</u> <u>acting</u> <u>somewhere</u> (dez, sig, tab).

Four parameter analysis also neglects three other signs in the larger set of B-hand dez signs with varying attitudes or forearm presentation. These are signs that denote 'future', (a remote) 'his' or 'her(s)', and 'Thy' or 'God's' (in prayers or religious contexts). In all three the tab is unmarked and the sig is movement away from the signer, ∅ ⊟ ⊥. In FUTURE the forearm of the dez hand is unrotated—during the sig it moves forward,hand edgewise. In HIS or HERS the forearm is fully pronated and the hand bent back at the wrist. In THY the forearm is fully supinated and the hand and wrist both are bent slightly in (adducted not abducted). In all three of these signs palm direction is different but again it seems

most unlikely that any significance attaches to the direction in space the palm is facing when what the sign addressee sees is motion away from the signer in neutral space made by something moving that consists of a near vertical forearm presenting a hand straight or bent and unrotated or fully rotated in either of its possible directions.

Attempts at isolating orientation as a basic or phonemic contrast in ASL which ignore the tri-aspectual analysis confuse the dez as the forearm part of what acts with the sig as the rotational or linear action.[1] They go against signers' intuition as the foregoing shows and in another way. The maker of a sign finds palmar contact salient in SCHOOL, but in the sign for 'money' it is the backs of the fingers that do and feel the tapping action. In STOPPING the ulnar edge of the B-hand makes and feels the contact (action in STOP is a single tap or cut). In these three signs and most that involve contact, the signer is unconcerned with where the palm of the hand is facing but kinesthetically senses the pull or lack of it of the forearm rotating muscles as well as the touch of the contacting surfaces of dez and tab. In the non-contact signs the feel of the rotating musculature is as likely to be a part of the psychological "reality" of signing as is how a sign act looks.

One more sign of ASL contrasts with all the signs just considered. The sign meaning 'our' or 'ours' uses chest tab. The dez of OUR is B (although some signers may use what looks more like C) with the forearm vertical and at least partially if not fully pronated; but the dez or what acts is also characterized by a sharp bending at the elbow and adduction of the upper arm—thus positioning the hand at chest height (compare the high position of dez in FUTURE and THY). The sig for OUR is true double simultaneous action. While the hand moves from the right side of the chest (where the thumb or radial edge of the hand has been in contact), the rotating muscles turn the whole forearm-hand dez in supination (so that the final contact is of the little finger or ulnar edge of the hand with left side of chest). Two sets of muscles operate, one to move the arm-hand leftward, the other to rotate it. Orientation as a function of the direction the palm of the hand faces changes 180° during the performance of this sign, but there is no theory to specify whether its initial or final state is to be regarded as significant. Clearly, significant contrast is made by what acts and

[1] See Friedman (1977) and review (Stokoe 1978).

the details or features are to be found both in its configuration and in its attitude (rotational and angular arm positioning).

One benefit of analysis by aspects instead of by positing independent parameters is the economy if not elegance that it allows in notation. As was found in the original study and in preparation of the dictionary, a symbol denotes a specific muscle-caused change when it is used to indicate sig action. But the same symbol, still indicating the identical muscle-caused change, can be used as a subscript to a handshape symbol to indicate that the action has been performed already to present the dez as it acts in the sign. To exemplify, OTHER, $\dot{A}^{a}$, is the thumb-out hand turning in supination, but $\dot{A}_{a}$ is the same thumb-out hand already in supination and ready to be used as the dez of some as yet unspecified sign.

Of course economy or ease in notation is secondary. The important point is that signing is muscular activity—to be sure it is brain directed even as speaking is brain directed muscular activity—but it uses a different set of muscles from those used for speech. Signing, but not speaking, permits an observer to see the muscle action, or its result, under two aspects: the action that the muscles are effecting (such as movement of fingers, hands, arms); and the action that the muscles have effected (such as the pronation that has put the flat hand in the proper formation for what acts in SCHOOL). This view of a sign as made up of what acts, what the active element does, and where reveals that the first two of these three aspects are primary and complementary. Thus, arm muscles pull the hand to the head as the action of KNOW, but arm muscles have also shaped the forearm and hand into what acts—otherwise touching the head might have signed 'think' or 'stupid'. By this same view, the aspect of place is secondary; it is important and must be specified when what acts is a hand or both hands, but it is redundant when what acts is an eyelid or the corners of the mouth

Looking at sign language activity as different aspects of unitary physical behavioral acts reminds us that although speech is sequential, signing is relatively simultaneous; and so this way of looking may yet lead to a linguistics different from that which deals with spoken languages and to an understanding of language itself more general than our present understanding of spoken languages and of signed languages.

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Manually produced signs *of American Sign Language are written, first with a* **tab** *symbol to show* **where** *the sign action occurs:*

- ∅ *in front of signer's body*
- ⌒ *face or head region*
- ⌒ *forehead or top of head*
- ⊔ *mid-face, nose, eyes*
- ∪ *chin, lower face*
- } *cheek, side of face, ear*
- ⊓ *neck, throat*
- [] *trunk (shoulders to hips)*
- \ *upper arm*
- / *forearm, elbow*
- Ω *back of hand, wrist*
- Ɔ *inside of wrist*

Next *with a* **dez** *symbol for the handshape, and attitude*, of* **what acts:**

- A *closed hand*
- À *thumb extended hand*
- B *flat hand*
- B̈ *bent hand*
- 5 *fully spread hand*
- C *curved hand*
- E *retracted hand*
- F *loop and 3/finger hand*
- G *index finger hand*
- H *double finger hand*
- I *little finger (pinkie) hand*
- K *'k' hand of fingerspelling angle hand, thumb & index*
- 3 *thumb & 1st 2 fingers spread*
- M *similar to* B̈ *or* O
- R *2nd finger crosses index*
- V *'victory' hand, spread*
- W *3 fingers spread, thumb on pinkie*
- X *index finger bent*
- Y *'y' hand of fingerspelling*
- 8 *mid-finger in from spread hand*

Then *with one or more* **sig** *symbols to show the sign* **action:**

Motion

- ^ *up*
- v *down*
- ᴺ *up & down*
- > *rightward*
- < *leftward*
- ᶻ *side to side*
- ᵀ *toward signer*
- ⊥ *away from signer*
- ᵀ *to & fro*
- ◎ *in a circle*

Internal (hand or finger)

- ⁿ *bend*
- ᵂ *wiggle*
- □ *open*
- # *close*

Interaction: hand w/ hand or body

- ⋊ *approach*
- × *touch*
- ⋕ *link or grasp*
- ✦ *cross*
- ⊙ *enter*
- ÷ *separate*
- ↔ *interchange*
- ~ *alternate*

* **Subscripts** *show how* **dez** *(D) is held:*

- D_a *supine (palm up or back)*
- D_b *pronated (palm down or out)*
- $\not D$ *forearm near vertical*
- $D_<$ *salient finger to left*

Diacritics *show detail of* **action:**

- Ȧ *sharp upward motion*
- ×̈ *repeated touching action*

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LANGUAGE
STRUCTURE

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by William C. Stokoe

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The First Linguistic Analysis of
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Newly Revised

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◇◇◇ As T. J. O'Rourke told the First National Symposium on Sign Language Research and Teaching (Chicago, May, 1977), this is the book that started it all.

◇◇◇ Long out of print, this first linguistic analysis of American Sign Language has now been reissued with additions and revisions by the author, who directs the Linguistics Research Laboratory at Gallaudet College.

◇◇◇ Its aspectual analysis of signs and the system of notation are retained to show the starting point for nearly two decades of research on sign languages. New material simplifies the notation and clarifies the analysis, as well as guiding the reader to key research done by a growing company of sign language scholars.

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